

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

اختبار شهر ابريل



Summary

of Unit 4

Lesson 1

- » To analyze data in Python, we use specific libraries to read, process, and visualize Excel files using the following commands:
 - `pip install pandas`: It installs Pandas library for data analysis and reading Excel files.
 - `pip install matplotlib`: It installs matplotlib library for creating graphs.
- » File Requirement: An Excel file (grades.xlsx) must exist in the same folder of the program.
- » We use the Pandas library to bring the data into our program.
- » The Code Explanation:

Code	Function
<code>import pandas as pd</code>	It imports pandas library, which helps us deal with data and tables.
<code>df= pd.read_excel('grades.xlsx')</code>	It reads data from a file "grades.xlsx" and stores it in a variable called df.
<code>print(df.head())</code>	It displays the first 5 rows of the Excel file.

» Basic Data Analysis:

Once the data is loaded, we can perform statistical analysis on specific subjects:

- **Mean:** `grades.mean()`: It calculates the average.
- **Max:** `grades.max()`: It finds the highest score.
- **Success Count:** `(grades > 13).sum()`: It counts students above a threshold.

» Visualization:

- `kind='bar'`: It creates a bar chart.
- `kind='pie'`: It creates a pie chart.
- `plt.show()`: It's always added after each plot to display it.

» Correlation (corr()): It measures the relationship between subjects.

- 1: Strong positive (both go up).
- 0: No relationship.
- -1: Inverse relation

Lesson 2

» Concept and Usage:

- In Python, conditional statements are used to make logical decisions by running code only if a condition is True.

» General Syntax:

- if condition: # If the condition is True, execute this code.
- else: # Otherwise, execute this code instead.

» Types of Conditional Statements:

- 1 Simple IF: It executes a code for one specific possibility.

```
Age = 18
if age >= 18:
    print("Allowed to enter")
```

- 2 IF... ELSE: It chooses between two different paths (if the first fails, the second runs).

```
age = 16
if age >= 18:
    print("Allowed to enter")
else:
    print("Sorry, you cannot enter") # This line runs because
    16 is less than 18
```

- 3 IF... ELIF... ELSE: It checks multiple conditions in sequence. It stops as soon as it finds a true one.

```
mark = 85
if mark >= 90:
    print("Excellent")
elif mark >= 75:
    print("Very Good") # This line runs because 85 is >= 75
elif mark >= 60:
    print("Good")
else:
    print("Fail")
```

Lesson 3

- 1 Loops:

» Loops help you repeat a specific task many times without rewriting the same code many times.

A) The for Loop:

- It's used when you know exactly how many times you want to repeat the code.

```
for i in range(5):
    print("Hello!") # This will print "Hello!" 5 times
```

- range(5) starts at 0 and goes up to 4 (total of 5 iterations).

B) The While Loop:

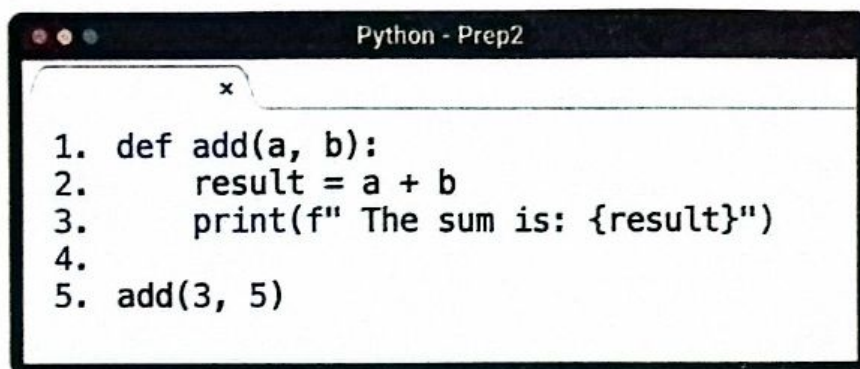
- It repeats the code as long as a condition is True.

```
x = 0
while x < 3:
    print("I am learning!")
    x += 1 # Increment x
```

- **Warning:** You must include an increment (like `x += 1`) to avoid an Infinite Loop.

2 Functions

- » We create functions using the `def` keyword.
- » The function does not work until we call it!
- » Some functions have parameters, which are inputs passed into the function to make it flexible.
- » `print()`: It shows the result on the screen.
- » `return`: It sends the value back to the program to be saved in a variable.



```

1. def add(a, b):
2.     result = a + b
3.     print(f" The sum is: {result}")
4.
5. add(3, 5)
  
```

Lesson 4

1 What are Data Structures?

- » Data Structures in Python are ways to organize and store multiple pieces of data.
- » You can think of them as specialized containers for different types of information.

Structure	Syntax	Usage	Notes
List	[]	Shopping lists, scores (can append, remove, sort).	Modifiable
Tuple	()	Constant data like days of the week or coordinates	Fixed
Dictionary	{ }	Fast access by unique keys (e.g., student records)	Key-Value pairs

» Main Operations:

Operation	Code	Explanation
Add	<code>grades. append(95)</code>	It adds a new grade.
Delete	<code>grades. remove(78)</code>	It deletes a specific grade.
Sort	<code>grades. sort</code>	It sorts items in order.

Lesson 5

» Cryptography: It's the art of converting readable (**Plaintext**) into unreadable (Ciphertext) form.

» Uses:

- Correct use: WhatsApp, HTTPS
- Wrong use: Ransomware

» Key Functions:

- `ord()`: It converts character into Unicode Number (e.g., 'A' → 65).
- `chr()`: It converts Number into Character (e.g., 65 → 'A').

» Encryption Methods:

1 Simple Encryption (Caesar Cipher):

- It shift letters by a specific number.
- Encryption: Original Code + Key = Encrypted Code.
- Decryption: Encrypted Code - Key = Original Code.

2 Complex Encryption (AES):

- It uses complex mathematical equations and very long keys.
- This is used by banks and major corporations.

Lesson 6

» Bitwise Operations:

- They are the fastest and most professional way a computer processes data.
- They are mathematical rules performed directly on these 1s and 0s.

» Bit: It's the smallest unit of data (1 or 0).

» The XOR Operator (^)

- Outputs 1 if inputs are different.
- Outputs 0 if inputs are the same.

» The Reversible Secret: XOR is used for professional encryption because applying the same key twice returns the original message.

- Step 1: $\text{Message} \wedge \text{Key} = \text{Ciphertext}$
- Step 2: $\text{Ciphertext} \wedge \text{Key} = \text{Message}$

Revision

on Unit 4

1

1

- The primary function of the pandas library is
 - drawing graphs
 - playing audio
 - analyzing data
 - creating websites
- The XOR operation results in 1 when values are
 - equal
 - different
 - both zero
 - both one
- If an "if" condition is False, the program
 - runs the code
 - skips it
 - stops completely
 - shows error
- The keyword "def" is used to
 - create variable
 - start loop
 - print text
 - define function
- is a data structure type that uses square brackets [].
 - Tuple
 - Set
 - List
 - Dictionary
- Plaintext is a/an
 - encrypted text
 - unreadable text
 - readable text
 - secret key
- is used to display a graph.
 - plt.show()
 - plt.start()
 - plt.run()
 - plt.open()
- The library used for reading Excel files and data analysis is
 - matplotlib
 - pandas
 - math
 - grades

2 Put (✓) or (X):

- 1 Bit is the smallest storage unit in a computer. ()
- 2 XOR operation results in 1 only when the two values are equal. ()
- 3 Bitwise operations are slow compared to regular arithmetic operations. ()
- 4 The chr() function in Python converts a number to its character. ()
- 5 The secret key does not have to be the same during decryption. ()
- 6 Simple encryption like Caesar Cipher is still used for major banks. ()
- 7 An else statement can be written without an if before it. ()

Model Exam**2****1 Choose the correct answer:**

- 1 library is used to create graphs in Python.
 - a. numpy
 - b. pandas
 - c. tkinter
 - d. matplotlib
- 2 What command loads an Excel file in python?
 - a. pd.load()
 - b. pd.read_excel()
 - c. pd.open()
 - d. df.read()
- 3 To convert results into a dictionary format for easier reading, we use
 - a. to_list()
 - b. to_graph()
 - c. to_excel()
 - d. to_dict()
- 4 is the correct "if" statement syntax.
 - a. if: condition
 - b. if condition:
 - c. condition if
 - d. if (condition)
- 5 A "for" loop is used when iterations are
 - a. condition based
 - b. unknown
 - c. run once
 - d. known

- 6 To draw a Pie Chart for the average grades, we use _____ .
- | | |
|----------------------------------|----------------------------------|
| a. <code>plot(kind='bar')</code> | b. <code>plot(kind='pie')</code> |
| c. <code>show(pie)</code> | d. <code>mean(shape)</code> |
- 7 The `.append()` function is used for _____ .
- | | |
|------------------|-------------------|
| a. adding items | b. deleting items |
| c. sorting items | d. changing types |
- 8 Which of the following is used to display the graph window
- | | |
|----------------------------|-----------------------------|
| a. <code>plt.show()</code> | b. <code>plt.start()</code> |
| c. <code>plt.run()</code> | d. <code>plt.open()</code> |

2 Put (✓) or (X):

- | | |
|--|-----|
| 1 Index numbering in a list starts from 1. | () |
| 2 XOR is unsuitable for encryption because it cannot be reversed. | () |
| 3 The computer internally deals with data in form of 0s and 1s. | () |
| 4 Bitwise operations are the basis of encryption. | () |
| 5 Encryption is a way to protect information from unauthorized access. | () |
| 6 Lists in Python allow you to modify elements. | () |
| 7 A while loop can work without a condition. | () |

Model Exam

3

1 Choose the correct answer:

- 1 The python code "`grades.mean()`" is used to calculate the _____ .
- | | |
|------------------|--------------------|
| a. highest grade | b. lowest grade |
| c. average grade | d. column deletion |
- 2 To install the matplotlib library, we use the code _____ .
- | | |
|--|--------------------------------|
| a. <code>pip install matplotlib</code> | b. <code>install pandas</code> |
| c. <code>pip install excel</code> | d. <code>get matplotlib</code> |

2

Model Exam

4

1 Choose the correct answer:

- 1 When checking multiple sequential conditions, we should use
 - a. IF ... ELIF ... ELSE
 - b. IF only
 - c. software
 - d. routers
- 2 The function `df.corr()` is used to calculate
 - a. row count
 - b. data removal
 - c. subject correlation
 - d. data average
- 3 To test multiple sequential conditions, use:
 - a. if only
 - b. else only
 - c. if...elif...else
 - d. print
- 4 A correct condition in Python is:
 - a. if x = 5
 - b. if x == 5:
 - c. if x => 5
 - d. if x =< 5
- 5 command is used to load an Excel file.
 - a. `pd.load_file( )`
 - b. `pd.read_excel( )`
 - c. `pd.open( )`
 - d. `df.read( )`
- 6 In Python data structures, index numbering always starts from
 - a. -1
 - b. 1
 - c. 0
 - d. 2
- 7 Dictionary keys must be:
 - a. repeated
 - b. unique
 - c. strings only
 - d. numbers only
- 8 The `chr( )` function converts
 - a. text
 - b. character to number
 - c. number to character
 - d. encrypted text

2 Put (✓) or (X):

- 1 Forgetting to change while-loop conditions causes infinite loops. ()
- 2 A function does not work unless it is called. ()
- 3 A function cannot contain parameters. ()
- 4 Code inside a python function must be indented. ()
- 5 A Tuple uses curly braces { }.
- 6 A List is written using square brackets []. ()
- 7 Forgetting to change while-loop conditions causes infinite loops. ()

Model Exam**5****1 Choose the correct answer:**

- 1 A/An is a collection of items that can be modified, added, or deleted.
 - a. List
 - b. Tuple
 - c. Constant
 - d. Integer
- 2 The result of training AI on incomplete or unfair data is
 - a. efficiency
 - b. bias
 - c. faster speed
 - d. better storage
- 3 A "while" loop runs while the condition is
 - a. Known
 - b. True
 - c. Zero
 - d. False
- 4 No condition change in "while" causes
 - a. an immediate stop
 - b. a system error
 - c. an infinite loop
 - d. a single run
- 5 Decryption is the process of converting back into Plaintext.
 - a. Ciphertext
 - b. UNICODE
 - c. the key
 - d. complex equations

- 6 To find the number of items in a list, we use the function.
- | | |
|------------|----------|
| a. count() | b. len() |
| c. sum() | d. add() |
- 7 A wrong use of encryption is
- | | |
|---------------------|--------------------|
| a. account security | b. data protection |
| c. website security | d. ransomware |
- 8 The function calculates the total sum of all numbers in a collection.
- | | |
|-----------|------------|
| a. len() | b. sum() |
| c. sort() | d. total() |

2 Put (✓) or (X):

- | | |
|--|-------|
| 1 The ord() function converts a character into a number. | () |
| 2 The secret key must be the same for encryption and decryption. | () |
| 3 The XOR operator is reversible and used in encryption. | () |
| 4 Simple encryption (like Caesar Cipher) is considered very secure for modern banking. | () |
| 5 A List cannot contain different data types. | () |
| 6 A Tuple is suitable for days of the week. | () |
| 7 Dictionaries allow adding elements after creation. | () |

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

اختبار شهر ابريل



practical application of data analysis from an Excel file Lives

Unit 4 lesson 1



Operating environment requirements:

The Library	The recommend libraries for (python packages) is:	Library function
pandas	pip install pandas	For analyzing data and reading Excel files.
matplotlib	pip install matplotlib	For creating charts and graphs.

An Excel file named grades.xlsx must be located in the same folder as the program for the code to work.

Look at student the data table on page 47.

File contents			
English	Science	Math	Name
15	11	12	Ali
12	14	14	Haled
13	15	13	mohammed
14	12	11	sabah
15	13	10	mustafa
12	13	15	yousef

1 Loading and Displaying Data:

```
import pandas as pd
```

```
df = pd.read_excel('grades.xlsx') # Load the file
```

```
print(df.head()) # Display the first 5 rows
```

The code explaining

Import the pandas library

This calls the library **pandas** to deal with the data, tables.

Read the excel file

```
df = pd.read_excel('grades.xlsx')
```

This code opens the Excel file and stores it in a variable called `df`.

Display the first 5 rows

`Print(df.head())` : This code prints only the first 5 rows to ensure the data format is correct. so we understand how is reading an excel file data and display some basic information about it.



Analyzing the basic data

```
grades = df[['Math', 'Science', 'English']]
print ("Average")
print(grades.mean().to_dict()) average grades for each subject.
print ("Maximum value")
print(grades.max().to_dict()) The greatest dgrade for each subject.
print ("Number of successful students")

print((grades > 13).sum().to_dict()) The number of the success student for each subject
```

The code	Its meaning
<code>grades = df[['Math', 'Science', 'English']]</code>	We selected only the grades for three subjects from the table (df): Mathematics, Science, and English, and placed them in a variable named <code>.grades</code>
<code>Print("Average")</code> <code>print(grades.mean().to_dict())</code>	We print the word "Average" and then calculate the average grade for each subject (i.e., the sum of the students' grades ÷ their number), and convert it to an easy-to-read format (a dictionary).
<code>print ("Maximum value")</code> <code>print(grades.max().to_dict())</code>	We print "Maximum value" and then display the highest grade any student achieved in each subject.
<code>Print("Number of successful students")</code> <code>Print((grades > 13).sum().to_dict())</code>	We print the number of students who passed each subject, then calculate the number of students who scored above 13 in each subject (i.e., passed), and display the number.
In short: This code performs a statistical analysis of the data in the table and displays: - The average grade for each subject. - The highest grade in each subject. -The number of students who passed each subject.	

Representing the data graphically

The code	Its meaning
<code>import matplotlib.pyplot as plt</code> <code>df.mean().plot(kind='bar')</code> #Graphing material averages <code>plt.show()</code> # display the graph	The code draws a bar graph of the average grades for the subjects.
<code>import matplotlib.pyplot as plt</code>	This line means that we are using a library called <code>matplotlib</code> , which helps us draw graphs.
<code>"as plt"</code>	Using the abbreviated name <code>plt</code> instead of the long name makes writing easier and saves time.
<code>grades.mean().plot(kind='pie')</code>	Here we tell the program: Take the average grade for each subject using <code>`grades.Mean()`</code> , then plot it as a circle using <code>plot(kind='pie')</code> <code>plt.show()</code>

Finally: We ask the program to display the graph.
The result: A graph appears with columns, each column representing the average grade for a subject. This makes it easy for us to compare grades quickly and clearly.

Analysis of basic data

It calculates the relationship between subjects in a spreadsheet.

What does this mean? It means: Does one subject affect another? For example, if a student excels in math, will they likely also excel in science?

What does the code result in? It will display numbers between -1 and 1.

If it's close to 1, the relationship is strong and positive (both subjects rise together).

If it's close to 0, there's no clear relationship.

If it's close to -1, the relationship is inverse (if one increases, the other decreases)..

1

School book exercise

Choose the correct answer :-

1. What is the primary function of the pandas library?.....

- A. Drawing graphs. B. Playing audio files.
C. Analyzing data and reading Excel files. D. Creating websites.

2. Which library is responsible for creating graphs in Python?.....

- A. NumPy. B. pandas. C. tkinter. D. matplotlib.

3. What command is used to load an Excel file?.....

- A. pd.load_file()- B. pd.read_excel()- C. pd.open()- D. df.read()-

4. What does the df.head() command do?.....

- A. Deletes the first 5 rows. B. Displays the first 5 rows.
C. Displays the last 5 rows. D. Displays the number of columns.

5. What type of graph is produced by grades.mean().plot(kind='bar')?

- A. Pie chart. B. Dot plot.
C. Line drawing. D. Bar drawing.

6- What does the following code do: grades.mean()?

- A. Calculate the highest grade. B. Calculate the lowest grade.
C. Calculate the average grade for each subject. D. Delete the columns.

7- What is the function of the following code: grades.max()

- A. Find the lowest grade. B. Find the highest grade.
C. Calculate the total grades. D. Count the number of students.

8- What is the function of the following code: grades > 13).sum()?

- A. Calculate the students' grades. B. Count the number of students above 13.
C. Compare students to each other. D. Reorder the grades.

9- What does: .df.corr() mean?

- A. Show the number of rows. B. Calculate the correlation between subjects.
C. Download the data. D. Calculate the average.

10- Which of the following is used to display the graph?

- A. plt.show()- B. plt.start()- C. plt.run()- d. -()plt.open



Put a check mark (✓) next to the correct statement, and a check mark (X) next to the incorrect statement.:

1. The pandas library is used to read Excel files and analyze data. ()
2. The `head()` function displays all the data in the table. ()
3. The matplotlib library can create bar, pie, and line graphs. ()
4. The `grades.max()` command calculates the average student grades. ()
5. `df.corr()` helps determine the relationship between different subjects. ()
6. `plt.show()` does not display the graph. ()
7. Using `(grades > 13)` gives true or false results for each student. ()
8. The `grades.mean()` code returns the highest grade, not the average. ()
9. The `grades.xlsx` file must be located in the same folder as your Python program for the code to function correctly. ()
10. Pandas can be used to create graphs without needing a separate library. matplotlib ()

conditional statements in Python Applications

Unit 4 lesson 2



The Concept of Conditional Statements:

In Python, conditional statements are used to make logical decisions based on the fulfillment of a specific condition.

These statements tell the program to execute a specific part of the code only if the condition is true.

what is the Conditional Statement:

A conditional statement is a programming construct that allows a program to choose between several paths of execution based on specified conditions.

General Syntax for a Conditional Statement:

```
if condition: ...If the condition is true
    execute this code .....
else:
    Otherwise execute this code instead .....
```

Types of Conditional Statements in Python:

1- If statement :

Example

```
age = 18
if age >= 18
Print("you can Enter")
```

2. If.....else statement:

Example

```
Age =16
If age >=18
Print("you can Enter")
Else:
Print("you could not Enter")
```


Practical example

3-if ...elif ...else statement:

example

```
mark = 85
if mark >= 90:
    print("Excellent")
elif mark >= 75:
    print("Very Good")
elif mark >= 60:
    print("Good")
else:
    print("Failed")
```

```
number = int(input("Enter a number: "))
if number > 0:
    print("The number is positive")
elif number < 0:
    print("The number is negative")
else:
    print("The number is zero")
```



2 School book exercise

Q2: Choose the correct answer from the following options:

1- What is the purpose of conditional statements in Python?.....

- A. To simply repeat code.
- B. To execute specific code when a condition is true.
- C. To define functions.
- D. To create variables.

2- What is the correct syntax for writing an if statement:.....

- A. if: condition
- B. if condition:
- C. condition if:
- D. if (condition) then

3- What happens if the condition in an if statement is false?.....

- A. The if code is executed.
- B. The program stops completely.
- C. The if statement is ignored and moves on to the next step.
- D. A programming error occurs.

4- The else statement is used when...

- A. The condition is always true.
- B. The condition is not present.
- C. We want to execute alternative code when the condition is not true.
- D. We want to define a variable.

5- Which of the following is a correct example of an if...else statement?.....

- | | |
|---------------------------------|----------------------------------|
| A. if x > 10 else: | B. if x > 10: else x: |
| C. if x > 10: print("OK") else: | D. print("NO"). if x > 10: else: |

6- What does the word elif mean?.....

- | | |
|--|--------------------------|
| A. End of program | B. Loop |
| C. Additional branch between if and else | D. A predefined function |

7- Which statement is used to test several consecutive conditions?.....

- | | |
|---------------------|--------------|
| A. if only | B. else only |
| C. if...elif...else | D. print |

8- What happens if the first condition in an if...elif...else sequence is true?.....

- | | |
|---|--|
| A. All conditions are executed | B. Only the elif condition is executed |
| C. The remaining conditions are ignored | D. A warning appears |

9- Which of the following is a true condition in Python?.....

- | | |
|--------------|---------------|
| A. if x = -5 | B. if x == 5 |
| C. if x => 5 | D. if x <=< 5 |

10- When writing:.....

age = 18

if age >= 18:

print(" You are allowed ")

What is the result?.....

- | | |
|---------------------------------------|-----------------------------------|
| A. Nothing will be printed. | B. An error will appear. |
| C. "You are allowed" will be printed. | D. "Not allowed" will be printed. |

Put a check mark (✓) next to the correct statement, and a check mark (X) next to the incorrect statement.:

1. An if statement is used to make a decision based on a condition. ()
2. An else statement can be written without an if statement before it. ()
3. More than one `elif` can be used in the same conditional statement. ()
4. A condition in Python must end with a semicolon (;). ()
5. An if statement can execute more than one line of code. ()
6. An `elif` statement is short for the `else` if statement. ()
7. The condition inside an `if` statement must be a calculation only. ()
8. A conditional statement can contain an `if` statement without `else`. ()
9. The code inside an `if` statement must be indented by only one space. ()
10. `if...elif...else` helps the program choose only one path to execute. ()

loops and functions

Unit 4 lesson 3



First: Loops : Loops help you execute a specific command multiple times without having to rewrite it over and over again

1-For loop :

It Use for :- Looping for a known number of iterations: We use this when we know beforehand how many times we want to repeat the code

General syntax:

Example

```
for i in range(5):    repeat "welcome" 5 times
Print("welcome")
```

Note: This means from 0 to 4 (5 times), and each command under `for` is executed in each repetition.

2-While loop :

It sue for a conditional repetition: It continues to run as long as the condition is true and stops as soon as it becomes false.

General syntax:

```
While condition :
```

The code that repeats as long as the condition is true #

(There must be something to change the condition, otherwise it will continue forever!)

Example

```
X=0
While x<3:    # if x is less than 3
Print("I am learning ")    # it will printed 3 times
X=x+1    # x will increase 1 each cycle
```

Notes: The loop continues as long as the condition ($x < 3$) is true.
Beware of infinite loops; if you forget to increment x , they will continue forever!

Example: Print numbers from 1 to 5 to:

```
for num in range(1, 6): # من 1 إلى 5
    print(num)
```

تعني من 1 إلى 5 (6 غير مشمولة) range(1, 6)

Notes: Adding the list numbers: n takes the value of each item in the list in order

```
numbers = [10, 20, 30]
sum = 0
for n in numbers: # لكل رقم في القائمة
    sum += n # أضفه إلى المجموع
print("المجموع =", sum) # الناتج: 60
```

Remember: Adding list numbers: - Use `for` when you know the number of times. - Use `while` when the repetition depends on a condition.

What is the function ?

Its function: To perform a specific task (such as calculating the sum of two numbers, printing a message, etc.)

Its benefit: It makes the code more organized, easier to understand, and easier to modify.

Notes:

Imagine a function as a small machine that performs a specific task when instructed to do so. Instead of writing the same code repeatedly, we write it

How to create a function:

```
def greet( ): # We use def to create a function.
    print("Hello! I am a beginner function") # The code inside the function
```

Note: The function does not work until we call it!

Code Explanation:

- `def` is short for define (definition), we use it to create a function.
- `greet()` is the function name (you can choose any name).
- `:` We put it after the function name.
- Indentation (`indent`): Necessary for all code inside the function

How to Call the Function:

`greet()` # Call the function to execute the code inside it

Result: Hello! I am a beginner function

with Parameters (Input):

```
def add(a, b):      # a and b are the function inputs
result = a + b
print(f"The sum is: {result}")
add(3, 5)          # Pass the numbers 3 and 5 to the function
```

Result:

The sum is: 8

Explanation of Parameters:

a, b: Values we pass to the function to work on them.

- {result}: We use **f-string** to display the result.

Function that Returns a Result(Return):

```
def multiply(x, y):
return x * y          # Returns the result instead of printing it
product = multiply(4, 6) # Save the result in a variable
print("The product is:", product)
```

Result: The product is: 24



The Difference Between print and return: -

print	return
displays the result on the screen only.	returns the result to use it later in the code

Notes:

Functions make your programs faster and easier to modify

3

School book exercise

First: Choose the correct answer from the following choices:

1. The for loop is used when:

- Repetition depends on a condition.
- The number of repetitions is unknown.
- We want to run the code only once.
- The number of repetitions is known.

2. A function in programming means:

- Repeating the code.
- A tool to perform a specific task.
- Storing data.
- Creating new variables.

3. The code inside the function must be:

- a) Without indentation.
- b) Written after a semicolon.
- c) Written with indentation (Indentation).
- d) Inside parentheses.

4. The keyword def is used for:

- a) Creating a variable.
- b) Creating a loop.
- c) Defining a function.
- d) Printing text.

5. The while loop continues to execute as long as:

- a) The number of repetitions is known.
- b) The condition is true.
- c) The number of repetitions = 0.
- d) The condition is false.

6. If we do not change the condition inside a while loop, it may cause:

- a) Immediate stop.
- b) System error.
- c) Infinite loop.
- d) Only one rotation.

7. The correct call to the function is by:

- a) Writing def only.
- b) Writing the function name followed by parentheses.
- c) Writing the variables inside print.
- d) Writing the file name.

8. Parameters in the function are:

- a) The values returned by the function.
- b) The values we pass to the function to work on them.
- c) The commands inside the function.
- d) The function name.

9. The difference between return and print is that return:

- a) Display the result on the screen.
- b) Store the result for later use.
- c) Repeats the code.
- d) Creates a new function.

10. The main purpose of functions is:

- Increasing the code length.
- Writing the same code several times.
- Making the program more organized.
- Eliminating the need for variable

Second : Put a check mark (✓) in front of the correct statement and an (X) in front of the incorrect statement:

- The for loop is suitable when you know the number of repetitions in advance. ()
- The while loop can work without a condition. ()
- Forgetting to change the condition inside a while loop may cause an infinite loop()
- The function does not work except when called. ()
- The function cannot contain parameters. ()
- The code inside the function must be indented. ()
- The return function is used to display the result on the screen only. ()
- Functions help organize the code and reduce repetition. ()
- The for loop always depends on a logical condition only. ()
- The function can be called more than once within the same program. ()



Data Structures or Collections

Identify data structures

They are ways to store data in a program in an organized way

Examples

- Shopping list (List): We write the items we want to buy.
- School timetable (Tuple): It is fixed and does not change during the week.
- Glossary (Dictionary): A data structure that stores data as pairs of keys and values.

(List)

A list is changeable. You can add or remove items.

- It uses square brackets [].

Unit 4 lesson 4



Examples

Example of Data Analysis:

Suppose we have students' grades in Mathematics, and we want to calculate the average:

```
grades = [85, 90, 78, 92, 88]          # List of grades
average = sum(grades) / len(grades)     # Sum of grades ÷ number of grades
print("The average is:", average)
```

Output: The average is: 86.6

Important Operations		
Operation	The code	Explanation
adding	grades. Append(95)	Add a new grade
Removing	grades. Remove(78)	Remove a grade
Sorting	grades.sort()	Sort grades

(Tuple)

- A tuple is not changeable (fixed).
- It uses round brackets ().

Data analysis example

suppose we have the days of the week and we cannot change

```
days = ("Saturday", "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday")
print("The third day is:", days[2])          # Counting starts from 0
```

Output: The third day is: **Monday**

When do we use a tuple?

When we need fixed data such as:

- Days of the week
- Location coordinates (latitude and longitude)

Dictionary

1. The dictionary is a collection of elements stored as a pair: value.
2. The dictionary is written between curly braces {} and separated by a colon:.
3. Used for quick access to data using the key instead of the index as in lists.
4. Keys must be unique and can be text or numbers.
5. We can add new items or change existing values easily.
6. It is often used to store organized data like students' or employees' data

Exercise (1):

```
student = {"name": "Ali", "age": 15, "grade": "A"}
print(student["name"])      # Print student name
student["age"] = 16         # Change age
student["city"] = "Cairo"   # Add new key
print(student)
```

Practical Exercises:

Looping Through the List

Exercise 1:-

You have a list of students' ages, write a program to count the number of

```
ages = [14, 16, 15, 17, 14, 16]      # List containing students' ages
count = 0                            # Variable starting from zero to count students older than 15
for age in ages:                     # Loop through each age in the list
    if age > 15:                      # Condition: Is the current age greater than 15?
        count += 1                  # If the condition is true, increase the counter by 1
print("The number of students older than 15 is:", count)
                                     # Print the number of students older than 15
```

Exercise 2:-

Loop through a list of names:

```
names = ["Mohamed", "Mona", "Haba", "Asmaa"]      # List of names
for name in names:                                # Iterate over each name in the list
    print(name)                                    # Print each
```



4

School book exercise

Questions and Exercises First: Choose the correct answer from the following choices:

1. What is meant by Data Structures?

- Ways to beautify the program's appearance.
- Ways to implement loops only.
- Ways to store data in the program in an organized manner.
- Commands to print texts.

2. Lists are characterized by:

- a. Fixed and non-modifiable.
- b. Written with regular parentheses ().
- c. Modifiable to add and remove elements.
- d. Cannot store more than one data type.

3. Which of the following uses square brackets?

- a. Tuple
- b. Set
- c. Dictionary
- d. List

4. The append() method is used for:

- a. Removing an element from the list.
- b. Adding a new element to the list.
- c. Sorting elements.
- d. Changing the list type.

5. Tuples are characterized by:

- a. Modifiable.
- b. Elements change automatically.
- c. Non-modifiable (fixed).
- d. Written with curly braces {}.

6. We use Tuple when we want data that is:

- a. Constantly changing.
- b. Fixed and unchanging.
- c. Automatically deleted.
- d. Dependent on keys and values.

7. The Dictionary stores data as:

- a. List inside a list.
- b. Key-value
- c. Values only without keys.
- d. Unordered elements.

8. Which of the following is used to write the dictionary?

- a. []
- b. ()
- c. { }
- d. <>

9. One of the properties of dictionary keys is that they:

- a. Can be repeated.
- b. Must be unique.
- c. Cannot be texts.
- d. Must be numbers only.

10. The dictionary is useful for storing:

- a. Fixed data only.
- b. Organized data like student data.
- c. Unique numbers only.
- d. Unordered elements.

Second: Put a check mark (✓) in front of the correct statement and an (X) in front of the incorrect statement:

- 1. Lists can be changed after creation. ()
- 2. Tuple elements can be changed. ()
- 3. Dictionary uses keys to access values. ()

4. Dictionary keys can be repeated. ()
5. List uses square brackets []. ()
6. Tuple uses curly brackets { }. ()
7. Dictionary is suitable for students' data. ()
8. List can store only one data type. ()
9. Tuple is suitable for fixed data like days of the week. ()
10. We cannot add new items to a dictionary. ()



Introduction to Encryption Using Python

Unit 4 Lesson 5



What is Cryptography?

It is the art of converting information from its original clear and understandable form called "**Plaintext**" into another unreadable form called "**Ciphertext**" that no one can read except the person who has the key to decrypting it. Think of it as a secret box with a lock and key!



1 Correct and Incorrect Uses of Cryptography:

Type of Use	Examples	Explanation
Correct use (Security)	Protecting messages (WhatsApp), securing passwords, secure websites (https://)	Used to protect your messages and data from hackers
Incorrect use (Harmful)	Ransomware viruses	Used to harm people by encrypting their files and asking for money

2 Types of Cryptography

Type	Explanation (Basic Idea)	Example
Simple encryption	Uses fixed and simple rules like shifting letters by a number (this is what we will learn)	Caesar Cipher
Complex encryption	Uses complex math equations and very long keys	AES (used by banks and companies)

Python's tools for cryptography

1 Function ord()

Function	Example
converts a letter to its secret number using Unicode	Ord (A) 65

2 Function chr ()

Function	Example
Converts a number back to its letter	Ord (65) A

Simple Examples:

Example 1

1. Find the code of a letter 'S':

```
print(ord('S'))
# Output: 83
```

Example: 2

2. Find the letter of a code

```
print(chr(72))
# Output: H
```

Example :3

3. Try shifting a letter 'D'(+1):

```
1 code_D = ord('D')
2 shifted_code = code_D + 1
3 print(chr(shifted_code))
4 # Output: E
```

Explanation:

1. Using the ord() function, it converts the letter 'D' to its number in the UNICODE table and stores it in the variable code_D.
2. It increases the resulting number by 1 to get the number of the next letter in the order.
3. It converts the new number to a letter using the chr() function and prints it on the screen.
4. The final output is the letter E.

Note:

The letters used are capital letters.

Encryption and Decryption in Python

We will use the shift method (Caesar Cipher) which relies on:

• Encryption:

Original letter code + encryption key = encrypted letter code



• Decryption:

Encrypted letter code – encryption key = original letter code



5 School book exercises

First: Choose the correct answer from the following choices:

1. What is meant by Plaintext?

- a. The encrypted text.
- b. The unreadable text.
- c. The original clear text.
- d. The text protected by a key.

2. Ciphertext is:

- a. The original text.
- b. The text understandable by everyone.
- c. The text after transformation to become incomprehensible.
- d. The text that does not contain a key.

3. Which of the following is considered a correct use of encryption?

- a. Spreading viruses.
- b. Demanding ransom.
- c. Protecting messages and passwords.
- d. Deleting data.

4. Which of the following is an incorrect use of encryption?

- a. Securing accounts.
- b. Encrypting data for protection.
- c. Securing websites.
- d. Ransomware viruses.

5. Simple encryption relies on:

- a. Complex equations.
- b. Very long keys.
- c. Fixed rules like shifting.
- d. Artificial intelligence.

6. Which of the following types is used in banks and companies to ensure maximum security?

- a. Simple encryptions.
- b. Complex encryption.
- c. Manual encryption.
- d. Shift encryption.

7. The ord() function is used for:

- a. Converting text to a sentence.
- b. Converting number to letter.
- c. Converting letter to its number in Unicode.
- d. Decryption only.

8. The chr() function's function is:

- a. Deleting letters.
- b. Converting letter to number.
- c. Converting number to letter.
- d. Encrypting texts.

9. Shift encryption relies on:

- Subtracting a random number.
- Swapping words.
- Adding a fixed value to the letter's number.
- Changing sentence order

10. Shift decryption is done through:

- Adding the encryption key.
- Deleting the first letter.
- Subtracting the key from the encrypted letter's number.
- Automatically swapping letters.

Second: Put a check mark (✓) in front of the correct statement and an (X) in front of the incorrect statement:

- Encryption is a way to protect information from unauthorized access. ()
- Anyone can easily read the encrypted text without the encryption key. ()
- Incorrect use of encryption includes encrypting files and demanding money to decrypt them. ()
- Simple encryption like Caesar cipher is still used in protecting major banks. ()
- The ord() function converts the letter to a number. ()
- The chr() function converts the number to the corresponding letter. ()
- Complex encryption relies on long keys and mathematical equations. ()
- In shift encryption, a fixed value is subtracted to produce the encrypted text()
- Shift decryption is done using the subtraction operation. ()
- Encryption is not used in daily applications like WhatsApp or banks. ()

Encryption in Python: How to turn messages into secrets using the XOR operator?

(Bitwise Operations)

Imagine your computer is a large box of small lamps, each lamp is either :

on (representing 1) or off (representing 0).

This is the bit, the smallest unit of



how does the computer talk?

- it does not speak in complicated words or numbers
- it speaks the language of lights: which is (0, 1)

(Bitwise Operations)

- The LEDs represent words and numbers
- they are the basic components of storage.

Bit-level operations = grammar rules

- These are the rules that govern how the LEDs are handled.
- Mathematical and logical operations are performed directly on the LEDs (i.e., on the zeros and ones).

The function of these operations is to:

- Read the state of the LEDs
- Change the state of the LEDs very quickly
- Make decisions
- Perform complex calculations

What are bitwise operations?

They are a way to process numbers based on their internal representation consisting of zeros and ones

Their function and uses:

- **Processing speed:** It is the fastest way to perform many arithmetic and logical operations.
- **Encryption:** And this is our exciting use today! As it is the basis for building encryption algorithms

The Secret Star: XOR (Exclusive OR) Operation:

read as "ex or" or logical exclusion, and symbolized by ^ in Python.

XOR Rule of Operation:

- Imagine you are studying the state of two bits.

The possible result is:

- the lamp is **on (1)** if the states of the two bits are different (**one on and the other off**),
- the lamp is **off (0)** if the states of the two bits are similar (**both on or both off**),



0,1

Using XOR in Encryption: "The Secret of the Reversible

- If you combine the message with the secret key using the XOR operator,
- you get the encrypted message.
- If you take the encrypted message and combine it with the same secret key using the XOR operator again, you will get the original message!

3. Encryption and Decryption in Python

In Python, we can deal with texts, where we need to convert each letter in it to a number so that we can apply the XOR operator on it.

Helper Tools:

ord()(letter): Converts the letter to the number corresponding to this letter in the "Unicode" table.

chr()(number): Converts the number to the corresponding letter in the "Unicode" table.

The fixed secret key: We will use the key 10 in all examples.

(Encryption Process)**Encrypting a Single Letter (A)**

Explanation: The letter "A" is encrypted directly without a loop, where it is converted to a number, the XOR operation is applied with key 10, then converted to an encrypted letter through the following code in Python:

```
1-secret_key = 10
2-original char = "A"
3-encrypted_char_num = ord(original_char) ^ secret_key
4-cipher_text = chr(encrypted_char_num)
5-print(f"Cipher: {cipher_text}")
```

Explanation:

1. The variable **secret_key** represents the encryption key, and its value here is 10 and is used in the encryption process.
2. The variable **original_char** contains the original letter to be encrypted, which is "A".
3. The letter 'A' is converted to its number in the **Unicode** table using **ord()**, then the **XOR operation (^)** is performed on it with the key **secret_key** to encrypt it.
4. The numerical result from the **XOR** operation is converted to an encrypted letter using the **chr()** function.
5. The final encrypted letter is displayed on the screen using text formatting (f-string).

Decryption code for the previous code:

```
1-secret_key = 10
2- cipher_text = "K"
3-encrypted_char_num = ord(cipher_text)
4-original_char_num= encrypted_char_num^ secret_key
5-decrypte_d_char = chr(original_char_num)
6-print (f "Decrypted: {decrypte_d_char}")
```


6 School book exercises

First: Choose the correct answer from the following choices:

1. The bit is:

- a. The largest unit of measurement in data.
- b. A complex electrical circuit.
- c. The smallest storage unit representing 0 or 1.
- d. A decimal number.

2. Bitwise operations are used because they are:

- a. Very slow.
- b. Complex and cannot be executed by the computer.
- c. The fastest way to process data.
- d. No relation to encryption.

3. XOR operation works such that the result is 1 when:

- a. The two values are similar.
- b. The two values are different.
- c. The two values are zero only.
- d. The two values are one only.

4. One of the features of XOR that makes it suitable for encryption is:

- a. That it completely changes the shape of the data.
- b. That it is an irreversible operation.
- c. That it is a reversible operation that can be used for encryption and decryption.
- d. That it works only on texts.

5. Bitwise operations are:

- a. Operations performed directly on words.
- b. Operations performed only on images.
- c. Operations performed on zeros and ones inside the computer.
- d. Slow and complex operations.

6. The ord() function in Python is:

- a. Converting text to random numbers.
- b. Converting text to a list.
- c. Converting the letter to its number in Unicode.
- d. Converting the number to a letter.

7. XOR operation in Python is implemented using the symbol:

- a. +
- b. *
- c. &
- d. ^

8. The reversible property of XOR means:

- That the operation is performed only once.
- That XOR cannot be used for decryption.
- That performing it twice with the same key restores the original value.
- That the operation always changes the data.

9. The secret key used in encryption must:

- Change in each step.
- Be the same in both encryption and decryption operations.
- Not be used in decryption.
- Be a letter only.

10. Bitwise operations are important because they are:

- Work only on words.
- A fundamental part of the computer's implementation of decisions and operations.
- Not used in modern applications.
- Limited to games only.

Second: Put a check mark (✓) in front of the correct statement and an (X) in front of the incorrect statement:

- The bit is the smallest storage unit in the computer. ()
- XOR operation gives the result 1 only when the two values are equal. ()
- XOR operator can be used in encryption because it has a reversible property. ()
- Bitwise operations are slow compared to regular arithmetic operations. ()
- The chr() function in Python converts the number to the corresponding letter in the Unicode table. ()
- One of the properties of XOR is that it is not suitable for encryption because it cannot be reversed. ()
- The computer internally deals with data in the form of 0 and 1. ()
- The secret key should not be the same when decrypting. ()
- Bitwise operations are the basis for encryption and pattern detection inside the computer. ()
- XOR operation is used only in texts and does not work on numbers. ()



Answers, s keys to the questions in Unit 4

Lesson 1

Choose				True or false			
1	Data analysis and reading Excel. file	6	Calculate the average grade for each subject	1	√	6	X
2	.matplotlib	7	Find the highest grade	2	X	7	√
3	.pd.read_excel()	8	Calculate the number of students above 13.	3	√	8	X
4	.Displays the first 5 rows	9	alculate the correlation between subjects.	4	X	9	√
5	Drawing columns.	10	plt.show ()	5	√	10	X

Lesson 2

Choose				True or false			
1	Execute a specific code when a condition is met	6	Additional branch between if and else	1	√	6	√
2	if condition	7	.if...elif...else	2	X	7	X
3	.pd.read_excel()	8	The remaining conditions are ignored.	3	√	8	X
4	.We want to implement alternative code when the condition is not met	9	.if x == 5	4	X	9	√
5	.if x > 10: print("OK") else	10	"You are allowed" will be printed	5	√	10	√

Lesson 3

Choose				True or false			
1	The number of iterations is known	6	Infinite loop	1	√	6	√
2	A tool to perform a specific task.	7	.Write the function name followed by parentheses	2	X	7	X
3	Written with an indent. (Indentation).	8	The values passed to the function to operate on	3	√	8	√
4	Function definition	9	Stores the result for later use	4	√	9	X
5	Condition is true.	10	Makes the program more organized	5	X	10	√

Lesson 4

Choose				True or false			
1	Methods for storing data in the program in an organized manner	6	Constant and unchanging	1	√	6	X
2	Items can be added and deleted	7	Key Value	2	X	7	√
3	List	8	}	3	√	8	X
4	Add a new item to the list.	9	It must be unique	4	X	9	√
5	Non-adjustable (fixed).	10	Structured data such as student data	5	√	10	X

Lesson 5

Choose				True or false			
1	Clear original text	6	Complex Encryption	1	✓	6	✓
2	Text after being transformed into unintelligible text	7	Converting a character to its Unicode number	2	X	7	✓
3	Protection of messages and passwords	8	Converting a number to a character	3	✓	8	X
4	Ransomware	9	Adding a constant value to the character number	4	X	9	✓
5	Fixed rules such as offset	10	Subtracting the key from the encrypted character number	5	✓	10	X

Lesson 6

Choose				True or false			
1	The smallest unit of storage, representing 0 or 1	6	Converting a character to its corresponding number in Unicode	1	✓	6	X
2	The fastest way to process data.	7	Λ	2	X	7	✓
3	The two values are different.	8	Performing XOR twice with the same key returns the original value.	3	✓	8	X
4	It is a reverse operation that can be used for encryption and decryption	9	The key must be the same in both encryption and decryption.	4	X	9	✓
5	Operations performed on zeros and ones within a computer	10	This is a fundamental part of how computers execute decisions and processes	5	✓	10	X

1. What is the best description of artificial intelligence?

- A. Making machines faster and stronger.
- B. Making machines think and learn like humans.
- C. Making machines bigger.
- D. Making machines smaller.

2. Which scientist created a famous test to determine if a machine is intelligent?

- A. Isaac Newton
- B. Albert Einstein
- C. Alan Turing
- D. Al-Khwarizmi

3. Why is learning artificial intelligence important for your future?

- A. Because it will soon disappear.
- B. Because it will become an essential part of our jobs and daily lives.
- C. Because it is a difficult and complex subject only for customers.
- D. Because it is an entertainment tool.

4. A computer learning to play chess and beat the best players is an early example of:

- A. Machine learning
- B. The internet
- C. 3D printing
- D. Using office software

5. How can artificial intelligence help solve the problem of traffic congestion?

- A. By manufacturing more cars
- B. By analyzing data and organizing traffic flow
- C. By removing traffic lights,
- d) By disabling car movement.

6. The statement "Artificial intelligence is a powerful tool" means that:

- a) we should fear and avoid it
- b) we should understand its impact and direct it to serve humanity
- c) no one can control it
- d) its irresponsible use



حمل الآن

مجاناً وحصرياً

المراجعة رقم (3)

اختبار شهر ابريل



Unit Two

Lesson One: Practical Application on Data Analysis from an Excel File

Operating Environment Requirements

Before starting, we need to install the following Python libraries:

Library	Installation Command (Terminal)	Library Function
pandas	pip install pandas	For data analysis and reading Excel files
matplotlib	pip install matplotlib	For creating charts and visual graphs

Note:

An Excel file named **grades.xlsx** must be located in the same folder as the Python program for the code to work correctly.

Excel File Contents

Name	Math	Science	English
Ali	12	11	15
Haled	14	14	12
Mohammed	13	15	13
Sabah	11	12	14
Mustafa	10	13	15
Yousef	15	13	12

First: Loading and Displaying the Data

Use the following code to start:

```
import pandas as pd
```

```
df = pd.read_excel('grades.xlsx') # Load the Excel file
```

```
print(df.head()) # Display the first 5 rows
```

💡 Simple Code Explanation:

- import pandas as pd : imports the library responsible for tables and data handling.
- pd.read_excel() : opens the Excel file and stores it in a variable called df.
- df.head() : displays only the first 5 rows to preview the data.

📊 Second: Basic Data Analysis

Now we want to extract useful statistics for **Math, Science, and English** grades:

```
grades = df[['Math', 'Science', 'English']]
print("Average")
print(grades.mean().to_dict())
print("Maximum value")
print(grades.max().to_dict())
print("Number of successful students")
print((grades > 13).sum().to_dict())
```

🔍 Tool Explanation:

- grades.mean() : calculates the average (sum ÷ number of students).
- grades.max() : finds the highest score in each subject.
- (grades > 13).sum() : counts how many students scored more than 13 (passing grade).

📉 Third: Data Visualization

To convert numbers into easy-to-understand charts:

```
import matplotlib.pyplot as plt
# Bar chart for subject averages
grades.mean().plot(kind='bar')
plt.show()
# Pie chart for subject averages
grades.mean().plot(kind='pie')
plt.show()
```



What Do These Commands Mean?

- `kind='bar'` : draws vertical bars to compare subjects.
- `kind='pie'` : draws a circular chart showing each subject's share.
- `plt.show()` : displays the chart on the screen.

Fourth: Interpreting Results (Correlation)

Is there a relationship between students' performance in Math and Science?

```
print(df.corr())
```

Result Meaning:

- Value close to **1** → strong positive relationship.
- Value close to **0** → no clear relationship.
- Value close to **-1** → inverse relationship.

 Model (1)**A) True or False (8)**

1. Pandas is used to read Excel files. ()
2. The Excel file must be in the same folder as the program. ()
3. df.head() shows all rows in the file. ()
4. grades.mean() calculates averages. ()
5. Matplotlib is used for data visualization. ()
6. A bar chart compares values visually. ()
7. Correlation measures relationships between data. ()
8. grades.max() finds the lowest value. ()

B) Choose the correct answer (7)

1. The command used to read Excel files is:
(a) pd.read_csv (b) pd.read_excel (c) pd.open (d) pd.load
2. The passing grade is:
(a) >10 (b) >11 (c) >12 (d) >13
3. Which library draws charts?
(a) NumPy (b) Pandas (c) Matplotlib (d) Math
4. df represents:
(a) A list (b) A DataFrame (c) A loop (d) A chart
5. grades.max() returns:
(a) Average (b) Minimum (c) Maximum (d) Count
6. kind='pie' creates:
(a) Bars (b) Lines (c) Circle chart (d) Table
7. Correlation value near 1 means:
(a) No relation (b) Weak relation (c) Strong relation (d) Random data

 Model (2)**A) True or False (8)**

1. Matplotlib must be installed before use. ()
2. pd is a shortcut for Pandas. ()
3. `grades > 13` checks for successful students. ()
4. Pie charts show comparisons clearly. ()
5. `df.corr()` checks relationships between subjects. ()
6. Excel data cannot be analyzed in Python. ()
7. `grades.mean()` works on numeric columns. ()
8. Bar charts use `kind='bar'`. ()

B) Choose the correct answer (7)

1. Which file name is required?
(a) data.xlsx (b) marks.xlsx (c) grades.xlsx (d) sheet.xlsx
2. The highest grade is found using:
(a) mean (b) max (c) min (d) sum
3. DataFrame is created by:
(a) `read_excel` (b) `show` (c) `plot` (d) `corr`
4. Correlation close to 0 means:
(a) Strong relation (b) Weak relation
(c) Inverse relation (d) Perfect relation
5. Which subject is NOT analyzed?
(a) Math (b) Science (c) English (d) History
6. `grades` is an example of:
(a) Dictionary (b) DataFrame (c) Loop (d) Function
7. Visualization helps to:
(a) Hide data (b) Delete data (c) Understand data (d) Encrypt data

 Model (3)**A) True or False (8)**

1. Python can analyze Excel files. ()
2. df.head() displays sample data. ()
3. grades.mean() calculates the sum only. ()
4. Matplotlib uses plt.show() to display charts. ()
5. Correlation can be positive or negative. ()
6. Pie charts use kind='bar'. ()
7. Pandas handles tabular data. ()
8. grades.max() returns highest scores. ()

B) Choose the correct answer (7)

1. Which library handles tables?
(a) Pandas (b) Matplotlib (c) NumPy (d) OS
2. Successful students scored:
(a) <13 (b) =13 (c) >13 (d) <10
3. df.corr() measures:
(a) Average (b) Maximum (c) Relationship (d) Count
4. plt.show() is used to:
(a) Save file (b) Display chart (c) Delete data (d) Load Excel
5. grades.mean() returns:
(a) Numbers (b) Charts (c) Averages (d) Text
6. Which is a visual chart?
(a) Pie (b) Loop (c) List (d) Variable
7. Excel file contains:
(a) Code (b) Images (c) Grades (d) Videos

 Model (4)**A) True or False (8)**

1. Pandas reads Excel files. ()
2. grades is a subset of df. ()
3. Bar charts compare subjects. ()
4. Correlation value -1 means inverse relation. ()
5. Matplotlib is optional for visualization. ()
6. df.head() shows last rows only. ()
7. grades.max() finds highest values. ()
8. Python supports data analysis. ()

B) Choose the correct answer (7)

1. Which command installs Pandas?
(a) install pandas (b) pip pandas (c) pip install pandas (d) get pandas
2. The function that calculates average is:
(a) mean (b) max (c) min (d) corr
3. Which chart shows proportions?
(a) Bar (b) Pie (c) Line (d) Table
4. grades > 13 checks:
(a) Failed students (b) All students
(c) Successful students (d) Absent students
5. df is short for:
(a) Data File (b) Data Frame (c) Data Form (d) Data Field
6. Correlation close to -1 means:
(a) Strong positive (b) No relation (c) Strong negative (d) Random
7. Data visualization purpose is to:
(a) Confuse users (b) Simplify understanding
(c) Delete data (d) Hide results

🏠 Unit Two

📖 Lesson Two: Conditional Statements in Python

□ Concept of Conditional Statements

In Python, **conditional statements** are used to make logical decisions based on whether a certain condition is true.

They tell the program to execute a specific part of the code **only if the condition is met**.

🔧 General Syntax of Conditional Statements

```
if condition:    # if the condition is true
```

```
    # execute this code
```

```
else:           # otherwise
```

```
    # execute this code instead
```

🔗 Types of Conditional Statements in Python

1 □ Simple if Statement

Executes the code **only if the condition is true**.

```
age = 18
```

```
if age >= 18:
```

```
    print("You are allowed to enter")
```

2 □ if ... else Statement

Executes **one of the two branches**: the first if the condition is true, the second if it is false.

```
age = 16
```

```
if age >= 18:
```

```
    print("You are allowed to enter")
```

```
else:
```

```
    print("Sorry, you cannot enter")
```

3 if ... elif ... else Statement

Used to test **multiple consecutive conditions**.

```
mark = 85
```

```
if mark >= 90:
```

```
    print("Excellent")
```

```
elif mark >= 75:
```

```
    print("Very Good")
```

```
elif mark >= 60:
```

```
    print("Good")
```

```
else:
```

```
    print("Fail")
```

Practical Example

A code that asks the user to input a number and determines its type:

```
number = int(input("Enter a number: "))
```

```
if number > 0:
```

```
    print("The number is positive")
```

```
elif number < 0:
```

```
    print("The number is negative")
```

```
else:
```

```
    print("The number is zero")
```

 Model (1)**A) True or False (8)**

1. Conditional statements decide which code to execute. ()
2. if executes code only if the condition is false. ()
3. else runs when the if condition is not met. ()
4. elif allows testing multiple conditions. ()
5. Python uses indentation to define code blocks. ()
6. input() is used to get user input. ()
7. Conditional statements cannot handle numbers. ()
8. if number > 0: checks if the number is positive. ()

B) Choose the correct answer (7)

1. What executes if the condition in if is false?
(a) if (b) elif (c) else (d) input
2. Which statement tests multiple conditions?
(a) if ... else (b) if ... elif ... else (c) input (d) print
3. int(input()) does what?
(a) Prints a number (b) Converts input to integer
(c) Creates a list (d) Checks condition
4. If mark = 80, which branch runs?
(a) Excellent (b) Very Good (c) Good (d) Fail
5. The : symbol in Python:
(a) Ends a statement (b) Starts a block
(c) Prints text (d) Comments code
6. What is the output if number = 0?
(a) Positive (b) Negative (c) Zero (d) Error
7. Conditional statements are used to:
(a) Repeat code (b) Make decisions (c) Store data (d) Draw charts

 Model (2)**A) True or False (8)**

1. if runs code only when the condition is true. ()
2. elif comes before if. ()
3. else runs if no previous condition is true. ()
4. Python ignores indentation in conditional statements. ()
5. You can have multiple elif statements. ()
6. input() returns a string by default. ()
7. print() displays output. ()
8. $\text{number} < 0$ checks for negative numbers. ()

B) Choose the correct answer (7)

1. Which is correct syntax?
(a) if condition: (b) if condition {} (c) if condition () (d) if condition ;
2. To check if a number is negative:
(a) $\text{number} > 0$ (b) $\text{number} < 0$ (c) $\text{number} = 0$ (d) $\text{number} \geq 0$
3. If $\text{age} = 16$, which prints?
(a) You can enter (b) Sorry, you cannot enter
(c) Age is valid (d) Input required
4. How do you test several marks?
(a) if only (b) if ... else (c) if ... elif ... else (d) input
5. What data type does $\text{int}(\text{input}())$ return?
(a) String (b) Integer (c) List (d) Boolean
6. Which statement handles the default case?
(a) if (b) elif (c) else (d) input
7. Indentation in Python is:
(a) Optional (b) Required (c) Random (d) Forbidden

 Model (3)**A) True or False (8)**

1. if statement is mandatory for all code. ()
2. elif is short for "else if". ()
3. else can appear without if. ()
4. Conditional statements guide code execution. ()
5. Python uses : to start code blocks. ()
6. You can nest if statements inside each other. ()
7. `int(input())` converts user input to integer. ()
8. `if number == 0:` checks for zero. ()

B) Choose the correct answer (7)

1. Which branch runs when all conditions fail?
(a) if (b) elif (c) else (d) input
2. Which statement allows testing multiple conditions?
(a) if ... else (b) if ... elif ... else (c) input (d) print
3. If `mark = 95`, which prints?
(a) Excellent (b) Very Good (c) Good (d) Fail
4. `print()` is used to:
(a) Input data (b) Display output
(c) Run condition (d) Assign variables
5. In `if number > 0:`, the `>` symbol means:
(a) Less than (b) Greater than (c) Equals (d) Not equals
6. Python conditional blocks use:
(a) Curly braces (b) Parentheses (c) Indentation (d) Semicolons
7. The default branch in multiple conditions is:
(a) if (b) elif (c) else (d) input

 Model (4)**A) True or False (8)**

1. if checks a condition. ()
2. else executes when if fails. ()
3. elif allows multiple checks. ()
4. Python ignores colons : in syntax. ()
5. Indentation defines code blocks. ()
6. `number > 0` is a valid condition. ()
7. Conditional statements cannot take input from users. ()
8. `print()` outputs results. ()

B) Choose the correct answer (7)

1. To take input from user:
(a) `input()` (b) `print()` (c) `int()` (d) `if`
2. To convert input to integer:
(a) `int(input())` (b) `str(input())` (c) `float(input())` (d) `list(input())`
3. If `age >= 18`, which prints?
(a) Access denied (b) You are allowed (c) Invalid (d) None
4. Which is used to test multiple conditions?
(a) `if` only (b) `if ... else` (c) `if ... elif ... else` (d) `print`
5. `else` runs when:
(a) Condition is True (b) Condition is False
(c) Condition is None (d) All
6. Colon : in Python marks:
(a) Comment (b) Start of block (c) Variable (d) End of line
7. Nested conditions are:
(a) Not allowed (b) Allowed (c) Optional (d) Forbidden

 Unit Two Lesson Three: Loops and Functions Part One: Loops

Loops help you **execute a specific command multiple times** without rewriting it repeatedly.

1 for Loop — For a known number of repetitions

Used when you **know in advance how many times** you want to repeat the code.

General Syntax:

for item in sequence:

 # code to repeat

 print(item) # print each element

Example:

```
for i in range(5):
```

```
    print("Hello!") # Prints "Hello!" 5 times
```

💡 **Note:** range(5) starts counting from 0 and stops before 5 (0, 1, 2, 3, 4).

2 while Loop — Repeating based on a condition

Continues running **as long as the condition is true**, and stops immediately when it becomes false.

```
x = 0
```

```
while x < 3:
```

```
    print("I am learning")
```

```
    x += 1 # Increment x to avoid an infinite loop
```

⚠️ **Warning:** Forgetting to increment x inside the loop causes an **infinite loop** that never stops!

Examples of for Loops

Example 1: Printing numbers 1 to 5

```
for num in range(1, 6): # From 1 to 5
```

```
    print(num)
```

Notes:

- range(1,6) means start at 1 and end before 6.
- Output: 1, 2, 3, 4, 5

Example 2: Summing numbers in a list

```
numbers = [10, 20, 30]
sum = 0
for n in numbers:
    sum += n
print("Sum =", sum) # Output: 60
```

Notes:

- n takes the value of each element in the list in order (10 → 20 → 30).
- Each value is added to sum.

★ Remember:

- ✓ Use for → when the number of repetitions is known.
- ✓ Use while → when repetition depends on a condition.

📁 Part Two: Functions

Imagine a function as a **small machine or template** containing code for a specific task.

Instead of writing the code 10 times, you write it **once** inside a function and **call it** whenever you need.

💡 What is a Function?

- **Purpose:** Execute a specific task (e.g., sum two numbers, print a message).
- **Benefit:** Makes code organized, readable, and easier to modify.

📁 How to Create a Function

```
def greet(): # Define the function
    print("Hello! I am a beginner function")
greet() # Call the function
```

Code Explanation:

- def → keyword to define a function.
- greet → function name, can be any descriptive name.
- () → parentheses for passing input values (parameters).
- : → indicates the start of the function body.
- Indentation → required for all code inside the function.

Output:

Hello! I am a beginner function

✚ **Note:** A function only works when called; defining it alone does not execute code.

◆ Function with Parameters (Input)

```
def add(a, b): # a and b are inputs
    result = a + b
    print(f"The sum is: {result}")
add(3, 5) # Pass numbers 3 and 5 to the function
```

Output:

The sum is: 8

Explanation:

- a, b → values passed to the function.
- result → stores the sum.
- f-string → displays text with variable values: f"The sum is: {result}".

◆ Function with Return Value

```
def multiply(x, y):
    return x * y # Returns the result instead of printing
product = multiply(4, 6) # Save the result in a variable
print("The product is:", product)
```

Output:

The product is: 24

Difference Between print and return:

- print → only displays the value; cannot use in further calculations.
- return → gives back the value; can store in a variable and use it later.

★ Remember:

Functions make your programs **faster, cleaner, and easier to modify.**

 Model (1)**A) True or False (8)**

1. Loops help repeat code multiple times. ()
2. for loop is used when repetition depends on a condition. ()
3. while loop stops when the condition becomes false. ()
4. Forgetting to increment a variable in while causes an infinite loop. ()
5. Functions execute automatically without being called. ()
6. def is used to define a function. ()
7. Parameters are inputs to a function. ()
8. return allows storing a value for later use. ()

B) Multiple Choice (7)

1. Which loop is used when the number of repetitions is known?
(a) for (b) while (c) if (d) def
2. Which statement continues as long as the condition is true?
(a) for (b) while (c) function (d) print
3. `sum += n` inside a loop does what?
(a) multiplies (b) adds to total (c) subtracts (d) prints
4. How do you call a function?
(a) def (b) print (c) greet() (d) return
5. `f"The sum is: {result}"` is an example of:
(a) Variable (b) f-string (c) Loop (d) Function
6. return differs from print because:
(a) only displays (b) returns value (c) ignores code (d) ends program
7. Infinite loops occur if:
(a) for used (b) while never ends (c) function called (d) def used

 Model (2)**A) True or False (8)**

1. for i in range(5) prints "Hello!" 5 times. ()
2. while x < 3 stops when x >= 3. ()
3. x += 1 prevents infinite loops. ()
4. Function body must be indented. ()
5. Parameters cannot be changed per function call. ()
6. print() displays output. ()
7. return allows the value to be stored. ()
8. A function runs automatically after definition. ()

B) Multiple Choice (7)

1. Which defines a function?
(a) def (b) while (c) for (d) if
2. How to pass numbers to a function?
(a) greet() (b) add(3,5) (c) print() (d) return
3. How do you sum list elements in Python?
(a) for loop (b) while loop (c) if statement (d) def
4. Which returns a value from function?
(a) print (b) return (c) input (d) f-string
5. while x < 5: means:
(a) loop forever (b) repeat until x < 5 is false
(c) define x (d) call function
6. sum = 0 inside a loop does what?
(a) stores total (b) prints (c) defines function (d) ends loop
7. multiply(x,y) returns:
(a) x+y (b) x*y (c) x/y (d) prints value

 Model (3)**A) True or False (8)**

1. Loops avoid rewriting the same code. ()
2. for loop iterates based on condition. ()
3. while needs a condition. ()
4. Forgetting increment in while creates infinite loop. ()
5. Functions are called using parentheses (). ()
6. def keyword defines a function. ()
7. return allows saving a result. ()
8. print() stores a result in a variable. ()

B) Multiple Choice (7)

1. To print each item in a list:
(a) for (b) while (c) def (d) return
2. To stop while loop:
(a) condition becomes false (b) def (c) return (d) print
3. $x += 1$ is used for:
(a) addition (b) subtraction (c) increment (d) return
4. Function with no input:
(a) greet() (b) add(a,b) (c) multiply(x,y) (d) return
5. $sum += n$ inside for does:
(a) subtract (b) add (c) multiply (d) return
6. `def multiply(x,y): return x*y` → product stored in:
(a) variable (b) loop (c) print (d) list
7. Indentation defines:
(a) block of code (b) loop (c) variable (d) parameter

 Model (4)**A) True or False (8)**

1. for loop runs for a known number of iterations. ()
2. while loop depends on a condition. ()
3. Functions require calling to execute. ()
4. Parameters are inputs for functions. ()
5. return lets you reuse the result. ()
6. print() can only display, not store. ()
7. Loops save time and reduce code repetition. ()
8. Forgetting increment in while causes infinite loop. ()

B) Multiple Choice (7)

1. Which is correct function call?
(a) greet() (b) def greet (c) while greet (d) for greet
2. What does `x += 1` do?
(a) Decreases (b) Increments (c) Multiplies (d) Prints
3. `sum = 0` is used to:
(a) store total (b) print (c) define function (d) return
4. Which prints output?
(a) print() (b) return (c) def (d) input
5. Loop through list items:
(a) for (b) while (c) def (d) return
6. Function that returns value:
(a) multiply(x,y) (b) greet() (c) print() (d) input
7. Infinite loop occurs when:
(a) while condition never false (b) for loop ends
(c) function returns (d) print()

Unit Two

Lesson Four: Data Structures (Collections)

What are Data Structures?

Data structures are **ways to organize data in a program** to make it easier to handle.

Real-life examples:

- **List** → like a shopping list, you can add or remove items.
- **Tuple** → like a school timetable, fixed and unchangeable.
- **Dictionary** → like a language dictionary, a key has a corresponding value.

1 Lists

A **list** is mutable (can be changed: add, remove, sort) and uses square brackets [].

Main operations:

Operation	Code	Explanation
Add	<code>grades.append(95)</code>	Add a new grade at the end of the list
Remove	<code>grades.remove(78)</code>	Remove a specific grade from the list
Sort	<code>grades.sort()</code>	Sort grades in ascending order

Example:

```
grades = [85, 90, 78, 92]
average = sum(grades) / len(grades)
print("Average is:", average)
```

2 Tuples

A **tuple** is immutable (cannot be changed) and uses parentheses (). Used for data that should never change, like days of the week or GPS coordinates.

Example:

```
days = ("Saturday", "Sunday", "Monday", "Tuesday")
print("The third day is:", days[2]) # Indexing starts at 0
```

3 Dictionaries

A **dictionary** stores data in **key: value pairs** using curly braces {}.

Features:

- Fast access using the key.
- Keys must be unique.
- Perfect for organized data like student info.

Example:

```
student = {"name": "Ali", "age": 15, "grade": "A"}  
print(student["name"]) # Output: Ali
```

Exercise (1): Working with Dictionaries

```
# Create a student dictionary  
student = {"name": "Ali", "age": 15, "grade": "A"}  
# Print student name  
print(student["name"])  
# Modify age  
student["age"] = 16  
# Add new city  
student["city"] = "Cairo"  
# Print full dictionary  
print(student)
```

Expected Output:

```
{'name': 'Ali', 'age': 16, 'grade': 'A', 'city': 'Cairo'}
```

Important Notes:

- Dictionary uses key: value.
- Access values by their key.
- Values can be modified easily.
- New items can be added without creating a new dictionary.

📌 Exercise (1): Count Students Older than 15

```
ages = [14, 16, 15, 17, 14, 16] # List of student ages  
count = 0 # Counter  
for age in ages: # Loop over all ages  
    if age > 15: # Check condition  
        count += 1  
print("Number of students older than 15:", count)
```

Expected Output:

```
Number of students older than 15: 3
```



Notes:

- for loops over each element.
- age takes each value in order.
- if checks the condition.
- count stores the total.

🔧 Exercise (2): Loop Over Names

```
names = ["Mohamed", "Mona", "Haba", "Asmaa"] # List of names
for name in names:
    print(name)
```

Expected Output:

Mohamed

Mona

Haba

Asmaa

Remember:

- ✓ Use for to iterate over a list.
- ✓ Variable name inside the loop can be any valid name.
- ✓ Each loop iteration represents one element of the list.

True/False (8 questions)

1. The pandas library is used to read Excel files. ()
2. The file grades.xlsx must be in the same folder as the program. ()
3. df.head() prints the last 5 rows of the data. ()
4. The command grades.mean() calculates the average of each column. ()
5. grades.max() shows the highest value in each subject. ()
6. (grades > 13).sum() counts the number of students with grades greater than 13. ()
7. plt.show() is used to display charts on the screen. ()
8. df.corr() checks the relationship between columns. ()

Fill in the blanks (8 questions)

1. The library used to handle Excel files in Python is _____.
a) pandas b) matplotlib c) numpy d) seaborn
2. To create bar charts, we use _____.
a) matplotlib b) pandas c) numpy d) seaborn
3. grades.max() gives the _____ grade in each subject.
a) highest b) lowest c) average d) total
4. (grades > 13).sum() counts students who are _____.
a) successful b) failing c) absent d) late
5. The method df.head() shows the first _____ rows of data.
a) 5 b) 10 c) 3 d) all
6. grades.mean() calculates the _____ grade for each column.
a) average b) maximum c) minimum d) sum
7. The command to check correlation between columns is _____.
a) df.corr() b) df.mean() c) df.max() d) df.sum()

True/False (8 questions)

1. The if statement executes code only if a condition is true. ()
2. else is executed when the if condition is false. ()
3. elif is used to check multiple conditions sequentially. ()
4. A conditional statement cannot have more than one elif. ()
5. if age >= 18: checks if age is at least 18. ()
6. if number > 0: checks if the number is negative. ()
7. else runs code when all previous conditions are false. ()
8. Conditional statements are only used in loops. ()

Fill in the blanks (8 questions)

1. The Python statement to execute code if a condition is true is _____. a) if b) else c) elif d) for
2. To provide an alternative when the condition is false, we use _____. a) else b) if c) elif d) while
3. To test multiple conditions sequentially, we use _____.
a) elif b) if c) else d) def
4. The if statement checks if a condition is _____.
a) true b) false c) numeric d) string
5. elif mark >= 75: tests if the mark is _____.
a) between 75 and 89 b) less than 75 c) above 90 d) zero
6. Conditional statements control the _____ flow of a program.
a) logical b) numerical c) text d) file
7. If none of the conditions are true, the _____ block executes.
a) else b) if c) elif d) for
8. if number > 0: checks if a number is _____.
a) positive b) negative c) zero d) imaginary

True/False (8 questions)

1. A for loop is used when the number of iterations is known. ()
2. A while loop continues as long as a condition is true. ()
3. Forgetting to increment the counter in a while loop can cause an infinite loop. ()
4. range(1, 6) generates numbers 1 through 5. ()
5. Functions make code more organized and reusable. ()
6. return in a function allows storing the result in a variable. ()
7. print displays the result but cannot store it in a variable. ()
8. Functions do not need to be called to execute. ()

Fill in the blanks (8 questions)

1. A loop used when the number of repetitions is known is called _____. a) for b) while c) if d) def
2. A loop that depends on a condition is a _____ loop.
a) while b) for c) if d) def
3. Forgetting to increment a counter in a while loop may cause a _____. a) infinite loop b) error c) break d) skip
4. A function is defined using the keyword _____.
a) def b) func c) function d) loop
5. To pass values into a function, we use _____.
a) parameters b) return c) print d) variables
6. The return statement allows a function to _____.
a) output a value b) print c) stop d) loop
7. print() only _____ the result.
a) displays b) returns c) stores d) saves
8. Calling a function executes the _____ inside it.
a) code b) loop c) print d) variable

True/False (8 questions)

1. Lists are mutable collections. ()
2. Tuples are immutable collections. ()
3. Dictionaries store data as key-value pairs. ()
4. Dictionary keys must be unique. ()
5. `grades.append(95)` adds a grade to the list. ()
6. `grades.sort()` arranges the list in ascending order. ()
7. `student["age"] = 16` modifies a value in a dictionary. ()
8. Tuples can be modified after creation. ()

Fill in the blanks (8 questions)

1. A collection that can be modified is called a _____.
a) list b) tuple c) dictionary d) set
2. A collection that cannot be changed is a _____.
a) tuple b) list c) dictionary d) set
3. Dictionaries store data in _____ pairs.
a) key-value b) item-index c) key-item d) value-index
4. To add an item to a list, we use _____.
a) append b) remove c) sort d) insert
5. To arrange a list in ascending order, we use _____.
a) sort b) append c) pop d) insert
6. To access a value in a dictionary, we use _____.
a) the key b) the index c) the value d) a number
7. To loop through a list, we use a _____ loop.
a) for b) while c) if d) def
8. To count students older than 15, we use a loop with a _____ condition. a) if b) for c) while d) def

Lesson 5: Introduction to Cryptography with Python

What is Cryptography?

Cryptography is the art of transforming information from its original readable form (Plaintext) into an unreadable form (Ciphertext), so that only someone with the secret key can read it.

Correct and Incorrect Uses of Cryptography

Type	Examples
Correct (Secure)	Protecting WhatsApp messages, securing passwords, and HTTPS websites.
Incorrect (Malicious)	Ransomware encrypting files to demand money.

Encryption Methods

- Simple encryption:** Uses fixed rules, e.g., shifting letters (Caesar Cipher).
- Complex encryption:** Uses mathematical formulas and long keys, e.g., AES used in banks.

Python Tools: ord() and chr()

Computers understand numbers, not letters.

Function	Purpose	Example
ord()	Converts a character to its numeric Unicode code	ord('A') → 65
chr()	Converts a numeric code to its character	chr(65) → 'A'

Examples

1. Get the Unicode code of a letter

```
print(ord('S')) # Output: 83
```

2. Get the letter for a numeric code

```
print(chr(72)) # Output: H
```

3. Character Shift

Shift D by 1:

```
code_D = ord('D')
```

```
shifted_code = code_D + 1
```

```
print(chr(shifted_code)) # Output: E
```



Caesar Cipher (Shift Cipher)

Encryption

```
encrypted_code = ord(char) + key
encrypted_char = chr(encrypted_code)
```

Decryption

```
original_code = ord(encrypted_char) - key
original_char = chr(original_code)
```

Example

```
char = 'S'
key = 2
encrypted = chr(ord(char) + key)
print("Encrypted:", encrypted)
decrypted = chr(ord(encrypted) - key)
print("Decrypted:", decrypted)
# Output: Encrypted: U, Decrypted: S
```

Summary

Concept	Explanation
Cryptography	Transform plaintext into ciphertext using a key
ord()	Converts letter to numeric Unicode
chr()	Converts numeric code to letter
Shift Encryption	Add key to original letter code
Decryption	Subtract key from encrypted letter code

Notes

- Examples use **capital letters**.
- The **same key** must be used for encryption and decryption.
- This method is **educational only** and not secure for real use.

True/False (8 questions)

1. Cryptography changes readable text into unreadable text. ()
2. Only someone with the secret key can read the ciphertext. ()
3. Caesar Cipher is an example of complex encryption. ()
4. ord() converts a letter to its numeric code. ()
5. chr() converts a number to a letter. ()
6. Using different keys for encryption and decryption works correctly. ()
7. Encryption with a shift key adds the key to the letter code. ()
8. Decryption subtracts the key from the encrypted letter code. ()

Fill in the blanks (8 questions)

1. The Python function used to convert a letter to a number is _____.
a) ord b) chr c) int d) str
2. To convert a number back to a letter, we use _____.
a) chr b) ord c) print d) input
3. A simple encryption method that shifts letters is called _____.
a) Caesar Cipher b) AES c) RSA d) MD5
4. The result of encryption is called _____.
a) ciphertext b) plaintext c) key d) code
5. To decrypt a message, we _____ the key from the letter code.
a) subtract b) add c) multiply d) divide
6. The key used for encryption must be the _____ for decryption.
a) same b) different c) larger d) smaller
7. This encryption method is _____ for real security.
a) educational b) safe c) unbreakable d) advanced
8. Capital letters in examples are important because their numeric codes are _____ from lowercase.
a) different b) same c) random d) negative

True/False (8 questions)

1. Cryptography can protect passwords. ()
2. Ransomware uses cryptography maliciously. ()
3. `ord('A')` outputs 65. ()
4. `chr(65)` outputs 'B'. ()
5. Adding the key to the letter code encrypts the letter. ()
6. Subtracting the key from the letter code decrypts it. ()
7. Complex encryption is used in banks and companies. ()
8. Shift encryption is secure for sensitive financial data. ()

Fill in the blanks (8 questions)

1. The numeric representation of letters in Python uses the ____ table.
a) Unicode b) ASCII c) HTML d) UTF-8
2. The letter 'D' shifted by 1 becomes _____.
a) E b) F c) C d) D
3. The type of ciphertext produced by Caesar Cipher is _____.
a) encrypted b) plaintext c) key d) number
4. To encrypt in Caesar Cipher, we _____ the key to the numeric code. a) add b) subtract c) multiply d) divide
5. To decrypt, we _____ the key from the encrypted code.
a) subtract b) add c) divide d) multiply
6. Python functions `ord()` and `chr()` are examples of _____ tools.
a) simple b) complex c) built-in d) external
7. The letter code changes when shifting because letters are represented by _____.
a) numbers b) symbols c) text d) formulas

True/False (8 questions)

1. Cryptography can be used correctly for secure communication. ()
2. Ransomware encrypts files for malicious purposes. ()
3. Caesar Cipher adds a fixed key to each letter's numeric code. ()
4. Decryption in Caesar Cipher involves adding the key. ()
5. `ord('S')` outputs 83. ()
6. `chr(72)` outputs 'H'. ()
7. Shift encryption example: 'D' becomes 'E' with key=1. ()
8. This Caesar Cipher method is not secure for real-life use.

Fill in the blanks (8 questions)

1. The original readable text is called _____.
a) plaintext b) ciphertext c) key d) code
2. The encrypted text is called _____.
a) ciphertext b) plaintext c) code d) number
3. `chr(65)` returns the letter _____.
a) A b) B c) C d) D
4. `ord('H')` returns the numeric code _____.
a) 72 b) 65 c) 83 d) 75
5. The encryption key is added to the letter code to produce _____.
a) encrypted letter b) original letter c) key d) number
6. To decrypt, the key is _____ from the code.
a) subtracted b) added c) multiplied d) divided
7. This method of encryption is best for _____ learning.
a) educational b) real c) secure d) advanced

True/False (8 questions)

1. Only someone with the correct key can decrypt the message. ()
2. Caesar Cipher is an example of simple encryption. ()
3. ord() converts letters to numeric codes. ()
4. chr() converts numeric codes to letters. ()
5. The numeric code for 'D' plus 1 gives 'E'. ()
6. Key value must match for encryption and decryption. ()
7. Shift encryption adds key to encrypt and subtracts key to decrypt. ()
8. This lesson uses lowercase letters for all examples. ()

Fill in the blanks (8 questions)

1. A simple encryption method in Python is _____.
a) Caesar Cipher b) AES c) RSA d) SHA
2. To convert letters to numbers, we use _____.
a) ord b) chr c) int d) str
3. To convert numbers back to letters, we use _____.
a) chr b) ord c) print d) input
4. Encryption adds a _____ to the original code.
a) key b) number c) letter d) symbol
5. Decryption _____ the key from the encrypted code.
a) subtracts b) adds c) multiplies d) divides
6. Encrypted text that cannot be read without a key is called _____.
a) ciphertext b) plaintext c) code d) input
7. The output of ord('S') is _____.
a) 83 b) 72 c) 65 d) 90
8. For correct decryption, we must use the _____ key.
a) same b) different c) random d) new

Lesson 6: Cryptography with Python – Bitwise Operations

1. Basics: Bit-Level Operations

Think of a computer as a big box of tiny lights; each light is either **on (1)** or **off (0)**.

This is a **Bit**, the smallest storage unit.

Bitwise operations are rules for manipulating these 0s and 1s.

Advantages:

- **Speed**: Fastest way to do arithmetic and logical operations.
- **Foundation of encryption**: Strongest data protection algorithms use bitwise operations.

2. The Secret Star: XOR Operation

XOR (Exclusive OR) is represented in Python as $\wedge$ and works on the "difference rule":

Condition	Result
Bits are different (0 & 1)	1 (on)
Bits are the same (0 & 0 or 1 & 1)	0 (off)

Reversible property:

- Encrypt: Original message XOR secret key → encrypted message
- Decrypt: Encrypted message XOR same secret key → original message

✓ Same operation works for **encryption** and **decryption**.

3. How to Encrypt Characters Using XOR in Python

Python cannot apply bitwise operations directly on letters, so we:

1. Convert the character to its **Unicode number**.
2. Apply **XOR** with a secret key.
3. Convert the result back to a **character**.

Tools:

- `ord()` → convert a character to a number
- `chr()` → convert a number to a character

Secret Key Example:

`secret_key = 10`



Encryption Example (Letter A):

```
secret_key = 10
original_char = "A"
encrypted_char_num = ord(original_char) ^ secret_key
cipher_text = chr(encrypted_char_num)
print(f"Cipher: {cipher_text}")
```

Step-by-step explanation:

1. secret_key = 10
2. original_char = "A"
3. ord(original_char) ^ secret_key = convert 'A' to number, then XOR with key
4. chr(encrypted_char_num) = convert result back to letter
5. print(f"...") = display encrypted character

4. Key Concepts

Concept	Explanation
Bit	Smallest unit of storage: 0 (off) or 1 (on)
Bitwise operations	Math operations done directly on 0 and 1
XOR (^)	Result = 1 if values differ, 0 if the same
Secret key	Fixed number used for both encryption and decryption
Reversible property	Applying XOR twice with the same key restores the original message

5. Decryption Example

```
secret_key = 10
cipher_text = "K" # encrypted letter
encrypted_char_num = ord(cipher_text)
original_char_num = encrypted_char_num ^ secret_key
decrypted_char = chr(original_char_num)
print(f"Decrypted: {decrypted_char}")
```

✓ Result: Original letter is successfully restored thanks to XOR's reversible property.

True/False (8 questions)

1. A bit can be either 0 or 1. ()
2. Bitwise operations are fast. ()
3. XOR returns 1 if the bits are the same. ()
4. XOR is reversible. ()
5. The same key can be used for encryption and decryption. ()
6. Python can directly apply XOR to letters without conversion. ()
7. ord() converts letters to numbers. ()
8. chr() converts numbers to letters. ()

Fill in the blanks (8 questions)

1. The smallest storage unit in computing is called a _____.
a) bit b) byte c) pixel d) code
2. XOR in Python is represented by _____.
a) ^ b) & c) | d) %
3. Applying XOR twice with the same key _____ the original message. a) restores b) deletes c) encrypts d) changes
4. The function used to convert a letter to a number is _____.
a) ord b) chr c) int d) str
5. The function used to convert a number to a letter is _____.
a) chr b) ord c) print d) input
6. The secret key must be _____ for encryption and decryption.
a) same b) different c) random d) new
7. Bitwise operations work on _____.
a) 0 and 1 b) letters c) words d) strings
8. XOR returns 0 if the bits are _____. a) same b) different c) random d) negative

True/False (8 questions)

1. Bitwise operations are the basis of strong encryption algorithms. ()
2. A bit can store multiple letters at once. ()
3. XOR returns 1 if the bits are different. ()
4. The encrypted message can be decrypted using the same XOR operation and key. ()
5. Python uses ord() and chr() for bitwise encryption on letters. ()
6. The key can be changed for decryption independently of encryption. ()
7. XOR encryption is suitable for learning. ()
8. Bitwise operations are slower than normal arithmetic operations. ()

Fill in the blanks (8 questions)

1. Bitwise operations are performed on _____.
a) bits b) letters c) strings d) pixels
2. XOR stands for _____.
a) Exclusive OR b) Inclusive OR c) AND d) NOT
3. Converting a letter to a numeric code uses the _____ function.
a) ord b) chr c) int d) str
4. Converting a numeric code back to a letter uses the _____ function.
a) chr b) ord c) print d) input
5. The secret number used in encryption is called a _____.
a) key b) code c) password d) cipher
6. Applying XOR twice with the same key _____ the original data.
a) restores b) deletes c) encrypts d) changes
7. A bit can be either _____.
a) 0 or 1 b) 1 or 2 c) letter or number d) true or false
8. Bitwise XOR is performed using the symbol _____.
a) ^ b) & c) | d) %

True/False (8 questions)

1. XOR can encrypt and decrypt messages. ()
2. The same secret key must be used for both encryption and decryption. ()
3. `ord('A')` ^ key produces a number. ()
4. `chr()` converts numbers to letters. ()
5. Bitwise operations are performed on letters directly. ()
6. XOR is not reversible. ()
7. Bitwise operations are faster than normal arithmetic operations. ()
8. XOR encryption is only suitable for learning, not real security. ()

Fill in the blanks (8 questions)

1. A bit is represented by either _____.
a) 0 or 1 b) letters c) numbers d) symbols
2. XOR is reversible, which means applying it twice with the same key .
a) restores the original b) encrypts c) deletes d) changes
3. The encrypted letter is called _____.
a) cipher b) plaintext c) key d) number
4. To decrypt a message, we apply XOR with the _____.
a) same key b) new key c) different key d) random key
5. The function that converts letters to numbers is _____.
a) `ord` b) `chr` c) `int` d) `str`
6. The function that converts numbers back to letters is _____.
a) `chr` b) `ord` c) `input` d) `print`
7. The key used in examples is _____.
a) 10 b) 5 c) 1 d) 100

True/False (8 questions)

1. XOR works on bit-level operations. ()
2. The secret key is fixed for both encryption and decryption. ()
3. ord('A') converts the letter to a numeric code. ()
4. chr() converts the numeric code back to a letter. ()
5. Bitwise operations are suitable for fast encryption. ()
6. XOR cannot encrypt letters without conversion.
7. The reversible property makes XOR ideal for simple encryption. ()
8. XOR encryption in this lesson is safe for real-world security. ()

Fill in the blanks (8 questions)

1. Bitwise operations manipulate _____.
a) bits b) letters c) words d) pixels
2. XOR produces 1 if the bits are _____.
a) different b) same c) negative d) random
3. XOR produces 0 if the bits are _____.
a) same b) different c) negative d) random
4. The secret key in the examples is _____.
a) 10 b) 5 c) 1 d) 100
5. To encrypt a letter, we first convert it using _____.
a) ord b) chr c) int d) str
6. To decrypt a letter, we convert the number back using _____.
a) chr b) ord c) input d) print
7. The reversible property allows _____ encryption and decryption using XOR. a) same key b) different key c) random key d) new key
8. XOR encryption is mainly used for _____.
a) learning b) advanced security c) banking d) real-world protection

حمل الآن

مجاناً وحصرياً

المراجعة رقم (4)

اختبار شهر ابريل



Revision

First: Choose the correct answer from the following options:

1. What is the purpose of conditional statements in Python?.....
 - a. To repeat code only
 - b. To execute specific code when a condition is true
 - c. To define functions.
 - d. To create variables
2. What is the correct syntax for writing an if statement?.....
 - a. if: condition
 - b. if condition:
 - c. condition if
 - d. if (condition) then
3. What happens if the condition in an if statement is false?.....
 - a. The if code executes
 - b. The program stops completely
 - c. The if statement is ignored and the program continues
 - d. A runtime error occurs
4. What is the main function of the pandas library?.....
 - a. Drawing charts
 - b. Playing audio files
 - c. Data analysis and reading Excel files
 - d. Creating websites
5. Which library is responsible for creating charts in Python?.....
 - a. numpy
 - b. pandas
 - c. tkinter
 - d. matplotlib
6. Which command is used to load an Excel file?.....
 - a. pd.load_file()
 - b. pd.read_excel()
 - c. pd.open()
 - d. df.read()
7. What does the command df.head() do?.....
 - a. Deletes the first 5 rows
 - b. Displays the first 5 rows
 - c. Displays the last 5 rows
 - d. Displays the number of columns
8. What type of chart is produced by: grades.mean().plot(kind=>bar>).....
 - a. Pie chart
 - b. Scatter plot
 - c. Line chart
 - d. Bar chart

9.What does the code `grades.mean()` do?.....

- a. Calculates the highest grade
- b. Calculates the lowest grade
- c. Calculates the average grade for each subject
- D. Deletes columns

10.What is the function of the following code: `grades.max()` ?.....

- a. Finds the lowest grade
- b. Finds the highest grade
- c. Calculates the total grades
- d. Counts the number of students

11 .What does the code `(grades > 13).sum()` do?.....

- a. Calculates students' grades
- b. Counts the number of students who scored above 13
- c. Compares students with each other
- d. Reorders the grades

12.What does `df.corr()` mean?.....

- a. Shows the number of rows
- b. Calculates the correlation between subjects
- c. Removes data
- d. Calculates the average

13 .Which of the following is used to display the chart?.....

- a. `plt.show()`
- b. `plt.start()`
- c. `plt.run()`
- d. `plt.open()`

14 .A for loop is used when:.....

- a. The repetition depends on a condition
- b. The number of repetitions is unknown
- c. We want to run the code only once
- d. The number of repetitions is known

15 .In programming, a function means:.....

- a. Repeating code
- b. A tool to perform a specific task
- c. Storing data
- d. Creating new variables

16 .The code inside a function must be:.....

- a. Without indentation
- b. Written after a semicolon(;)
- c. Written with indentation
- d. Inside parentheses

17 .The key word def is used for:.....

- a. Creating a variable
- b. Creating a loop
- c. Defining a function
- d. Printing text

18 .A while loop continues to execute as long as:.....

- a. The number of repetitions is known
- b. The condition is true
- c. The number of repetitions = 0
- d. The condition is false

19 .If we do not change the condition inside a while loop, it may cause:.....

- a. Immediate stop
- b. System error
- c. An infinite loop
- d. Only one iteration

20 .The correct way to call a function is:.....

- a. Writing def only
- b. Writing the function name followed by parentheses()
- c. Writing the variables inside print
- d. Writing the file name

21 .The else statement is used when.....

- a. The condition is always true
- b. The condition does not exist
- c. We want to execute alternative code if the condition is false
- d. We want to define a variable

22 .Which of the following is a correct example of if...else?.....

- a. if x > 10 else:
- b. if x >10: else x:
- c. x > 10 print(«OK») else:
- d. if x > 10: print("OK") else: print("NO")

23 .What does the keyword elif mean?.....

- a. End of the program
- b. A loop
- c. An additional branch between if and else
- d. A built-in function

24 .Which statement is used to test multiple consecutive conditions?.....

- a. if only
- b. else only
- c. if...elif...else
- d. print

25 .What happens if the first condition in an if...elif...else chain is true?.....

- a. All conditions are executed
- b. Only the elif condition executes
- c. The rest of the conditions are ignored
- d. A warning appears

26 .Which of the following is a correct condition in Python?.....

- a. x = 5
- b. x ==5
- c. if x =>5
- d. if x <=<5

27 .When writing:

age = 18

if age >= 18:

print(<<Allowed>>)

What is the result?.....

- a. Nothing will be printed
- b. An error will appear
- c. «Allowed» will be printed
- d. «Not allowed>> will be printed

28 .Parameters in a function are:.....

- a. The values returned by the function
- b. The values we pass to the function to work with
- c. The commands inside the function
- d. The function name

29 -The difference between return and print is that return:.....

- a. Displays the result on the screen
- b. Stores the result for later use
- c. Repeats the code
- d. Creates a new function

30 -The main purpose of functions is:.....

- a. To make the code longer
- b. To write the same code multiple times
- c. To make the program more organized
- d. To eliminate the need for variables

31 .One characteristic of dictionary keys is that they:.....

- a. Can be repeated
- b. Must be unique
- c. Cannot be texts
- d. Must be numbers only

32 .Dictionary is useful in storing:.....

- a. Fixed data only
- b. Organized data like student data
- c. Unique numbers only
- d. Unordered items

33 .What is meant by Data Structures?.....

- a. Ways to beautify program shape
- b. Ways to execute loops only
- c. Ways to store data in program in an organized manner
- d. Commands to print texts

34 .Lists are characterized by being:.....

- a. Fixed and immutable
- b. Written with parentheses()
- c. Mutable (adding and deleting items)
- d. Cannot store more than one data type

35 .Which of the following uses square brackets?.....

- a. Tuple
- b. Set
- c. Dictionary
- d. List

36 .Method append() is used to:.....

- a. Delete item from list
- b. Add new item to list
- c. Sort items
- d. Change list type

37 .Tuple is characterized by being:.....

- a. Mutable
- b. Items change automatically
- c. Immutable (Fixed)
- d. Written with braces{}

38 .We use Tuple when we want data that:.....

- a. Changes constantly
- b. Fixed and does not change
- c. Is deleted automatically
- d. Depends on keys and values

39 .Dictionary stores data in the form of:.....

- a. List inside list
- c. Values only without keys
- b. Key - Value
- d. Unordered items

40. Which of the following is used to write a Dictionary?.....

- a.[]
- b.()
- c.{ }
- d. <>

41 .Bit is:.....

- a. Largest measurement unit in data
- b. Complex electrical circuit
- c. Smallest storage unit and represents 0 or 1
- d. Decimal number

42 .Bitwise operations are used because they are:.....

- a. Very slow
- b. Complex and computer cannot execute them
- c. Fastest way to process data
- d. Irrelevant to encryption

43 .XOR operation works such that result is 1 when:.....

- a. Two values are similar
- b. Two values are different
- c. Two values are zero only
- d. Two values are one only

44 .One of XOR features making it suitable for encryption:.....

- a. It changes data shape completely
- b. It is an irreversible operation
- c. It is a reversible operation that can be used for encryption and decryption
- d. It works only on texts

45 .Bitwise operations are:.....

- a. Operations performed on words directly
- b. Operations performed on images only
- c. Operations performed on zeros and ones inside computer
- d. Slow and complex operations

46 .ord() is a function in Python whose function is:.....

- a. Convert text to random numbers
- b. Convert text to list
- c. Convert letter to its number in Unicode
- d. Convert number to letter

47 .XOR operation in Python is executed using symbol:.....

- a.+
- b.*
- c.&
- d. ^

48 .Reversible property of XOR means:.....

- a. Operation executes once only
- b. XOR cannot be used for decryption
- c. Performing XOR twice with same key restores original value
- d. Operation changes data always

49 .Secret key used in encryption must:.....

- a. Change in every step
- b. Be the same in both encryption and decryption operations
- c. Not be used in decryption
- d. Be a letter only

50 .Bitwise operations are considered important because they are:.....

- a. Working on words only
- b. Essential part of computer execution of decisions and operations
- c. Not used in modern apps
- d. Limited to games only

51 .What is meant by Plaintext?.....

- a. Encrypted text
- b. Unreadable text
- c. Original clear text
- d. Text protected by key

52 .Ciphertext is:.....

- a. Original text
- b. Text understood by everyone
- c. Text after converting it to become unintelligible
- d. Text containing no key

53 .Which of the following is considered a correct use of encryption?.....

- a. Spreading viruses
- b. Asking for ransom
- c. Protecting messages and passwords
- d. Deleting data

54 .Which of the following is considered an incorrect use of encryption?.....

- a. Securing accounts
- b. Encrypting data for protection
- c. Securing sites
- d. Ransomware

55 .Simple encryption relies on:.....

- a. Complex equations
- b. Very long keys
- c. Fixed rules like shifting
- d. Artificial Intelligence

56 .Which of the following types is used in banks and companies to ensure maximum security?

- a. Simple encryption
- b. Complex encryption
- c. Manual encryption
- d. Shift encryption

57 .Function ord() is used to:.....

- a. Convert text to sentence
- b. Convert number to letter
- c. Convert letter to its number in Unicode
- d. Decrypt only

58 .Function chr() functionality:.....

- a. Delete letters
- b. Convert letter to number
- c. Convert number to letter
- d. Encrypt texts

59 .Shift encryption relies on:.....

- a. Subtracting random number
- b. Swapping words
- c. Adding fixed value to letter number
- d. Changing sentence order

60 .Shift decryption is done through:.....

- a. Adding encryption key
- b. Deleting first letter
- c. Subtracting key from encrypted letter number
- d. Swapping letters automatically

Put (✓) or (X)

1. The pandas library is used to read Excel files and analyze data.
2. The head() function displays all the data in the table.
3. The matplotlib library can create bar, pie, and line charts.
4. The command grades.max() calculates the average grades of students.
5. df.corr() helps identify the relationship between different subjects.
6. plt.show() does not display the chart.
7. Using (grades > 13) gives true or false results for each student.
8. The code grades.mean() returns the highest grade, not the average.
9. The file grades.xlsx must be in the same folder as the Python program for the code to work correctly.
10. The command grades.mean() calculates the average grades of students.
11. Pandas can be used to create charts without the need for the matplotlib library.
12. plt.show() used to display the graph .
13. If the correlation value is close to 1, then the relationship between the items in the data table is positive and strong.
14. If the correlation value is close to -1, then the relationship between the items in the data table is inverse and weak.
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- 86.** f you combine the message with the secret key using the XOR operator, you will get the encrypted message.
- 87.** Bitwise operations are rapid mathematical movements performed directly on zeros and ones.

Revision

First: Choose the correct answer from the following options:

1. What is the purpose of conditional statements in Python?.....

a. To repeat code only

b. To execute specific code when a condition is true

c. To define functions.

d. To create variables

2. What is the correct syntax for writing an if statement?.....

a. if: condition

b. if condition:

c. condition if

d. if (condition) then

3. What happens if the condition in an if statement is false?.....

a. The if code executes

b. The program stops completely

c. The if statement is ignored and the program continues

d. A runtime error occurs

4. What is the main function of the pandas library?.....

a. Drawing charts

b. Playing audio files

c. Data analysis and reading Excel files

d. Creating websites

5. Which library is responsible for creating charts in Python?.....

a. numpy

b. pandas

c. tkinter

d. matplotlib

6. Which command is used to load an Excel file?.....

a. pd.load_file()

b. pd.read_excel()

c. pd.open()

d. df.read()

7. What does the command df.head() do?.....

a. Deletes the first 5 rows

b. Displays the first 5 rows

c. Displays the last 5 rows

d. Displays the number of columns

8. What type of chart is produced by: grades.mean().plot(kind=>bar>).....

a. Pie chart

b. Scatter plot

c. Line chart

d. Bar chart

9.What does the code `grades.mean()` do?.....

- a. Calculates the highest grade
- b. Calculates the lowest grade
- c. Calculates the average grade for each subject
- D. Deletes columns

10.What is the function of the following code: `grades.max()` ?.....

- a. Finds the lowest grade
- b. Finds the highest grade
- c. Calculates the total grades
- d. Counts the number of students

11 .What does the code `(grades > 13).sum()` do?.....

- a. Calculates students' grades
- b. Counts the number of students who scored above 13
- c. Compares students with each other
- d. Reorders the grades

12.What does `df.corr()` mean?.....

- a. Shows the number of rows
- b. Calculates the correlation between subjects
- c. Removes data
- d. Calculates the average

13 .Which of the following is used to display the chart?.....

- a. `plt.show()`
- b. `plt.start()`
- c. `plt.run()`
- d. `plt.open()`

14 .A for loop is used when:.....

- a. The repetition depends on a condition
- b. The number of repetitions is unknown
- c. We want to run the code only once
- d. The number of repetitions is known

15 .In programming, a function means:.....

- a. Repeating code
- b. A tool to perform a specific task
- c. Storing data
- d. Creating new variables

16 .The code inside a function must be:.....

- a. Without indentation
- b. Written after a semicolon(;)
- c. Written with indentation
- d. Inside parentheses

17 .The key word def is used for:.....

a. Creating a variable

c. Defining a function

b. Creating a loop

d. Printing text

18 .A while loop continues to execute as long as:.....

a. The number of repetitions is known

b. The condition is true

c. The number of repetitions = 0

d. The condition is false

19 .If we do not change the condition inside a while loop, it may cause:.....

a. Immediate stop

c. An infinite loop

b. System error

d. Only one iteration

20 .The correct way to call a function is:.....

a. Writing def only

b. Writing the function name followed by parentheses()

c. Writing the variables inside print

d. Writing the file name

21 .The else statement is used when.....

a. The condition is always true

b. The condition does not exist

c. We want to execute alternative code if the condition is false

d. We want to define a variable

22 .Which of the following is a correct example of if...else?.....

a. if x > 10 else:

b. if x >10: else x:

c. x > 10 print(«OK») else:

d. if x > 10: print("OK") else: print("NO")

23 .What does the keyword elif mean?.....

a. End of the program

b. A loop

c. An additional branch between if and else

d. A built-in function

24 .Which statement is used to test multiple consecutive conditions?.....

a. if only

b. else only

c. if...elif...else

d. print

25 .What happens if the first condition in an if...elif...else chain is true?.....

- a. All conditions are executed
- b. Only the elif condition executes
- c. The rest of the conditions are ignored**
- d. A warning appears

26 .Which of the following is a correct condition in Python?.....

- a. x = 5
- b. x ==5**
- c. if x =>5
- d. if x <=<5

27 .When writing:

age = 18

if age >= 18:

print(<<Allowed>>)

What is the result?.....

- a. Nothing will be printed
- c. «Allowed» will be printed**
- b. An error will appear
- d. «Not allowed>> will be printed

28 .Parameters in a function are:.....

- a. The values returned by the function
- b. The values we pass to the function to work with**
- c. The commands inside the function
- d. The function name

29 -The difference between return and print is that return:.....

- a. Displays the result on the screen
- b. Stores the result for later use**
- c. Repeats the code
- d. Creates a new function

30 -The main purpose of functions is:.....

- a. To make the code longer
- b. To write the same code multiple times
- c. To make the program more organized**
- d. To eliminate the need for variables

31 .One characteristic of dictionary keys is that they:.....

- a. Can be repeated
- b. Must be unique**
- c. Cannot be texts
- d. Must be numbers only

32 .Dictionary is useful in storing:.....

- a. Fixed data only
- b. Organized data like student data**
- c. Unique numbers only
- d. Unordered items

33 .What is meant by Data Structures?.....

- a. Ways to beautify program shape
- b. Ways to execute loops only
- c. Ways to store data in program in an organized manner**
- d. Commands to print texts

34 .Lists are characterized by being:.....

- a. Fixed and immutable
- b. Written with parentheses()
- c. Mutable (adding and deleting items)**
- d. Cannot store more than one data type

35 .Which of the following uses square brackets?.....

- a. Tuple
- b. Set
- c. Dictionary
- d. List**

36 .Method append() is used to:.....

- a. Delete item from list
- b. Add new item to list**
- c. Sort items
- d. Change list type

37 .Tuple is characterized by being:.....

- a. Mutable
- b. Items change automatically
- c. Immutable (Fixed)**
- d. Written with braces{}

38 .We use Tuple when we want data that:.....

- a. Changes constantly
- b. Fixed and does not change**
- c. Is deleted automatically
- d. Depends on keys and values

39 .Dictionary stores data in the form of:.....

- a. List inside list
- c. Values only without keys
- b. Key - Value**
- d. Unordered items

40. Which of the following is used to write a Dictionary?.....

- a.[]
- b.()
- c.{ }**
- d. <>

41 .Bit is:.....

- a. Largest measurement unit in data
- b. Complex electrical circuit
- c. Smallest storage unit and represents 0 or 1
- d. Decimal number

42 .Bitwise operations are used because they are:.....

- a. Very slow
- b. Complex and computer cannot execute them
- c. Fastest way to process data
- d. Irrelevant to encryption

43 .XOR operation works such that result is 1 when:.....

- a. Two values are similar
- b. Two values are different
- c. Two values are zero only
- d. Two values are one only

44 .One of XOR features making it suitable for encryption:.....

- a. It changes data shape completely
- b. It is an irreversible operation
- c. It is a reversible operation that can be used for encryption and decryption
- d. It works only on texts

45 .Bitwise operations are:.....

- a. Operations performed on words directly
- b. Operations performed on images only
- c. Operations performed on zeros and ones inside computer
- d. Slow and complex operations

46 .ord() is a function in Python whose function is:.....

- a. Convert text to random numbers
- b. Convert text to list
- c. Convert letter to its number in Unicode
- d. Convert number to letter

47 .XOR operation in Python is executed using symbol:.....

- a.+
- b.*
- c.&
- d.^

48 .Reversible property of XOR means:.....

- a. Operation executes once only
- b. XOR cannot be used for decryption
- c. Performing XOR twice with same key restores original value
- d. Operation changes data always

49 .Secret key used in encryption must:.....

a. Change in every step

b. Be the same in both encryption and decryption operations

c. Not be used in decryption

d. Be a letter only

50 .Bitwise operations are considered important because they are:.....

a. Working on words only

b. Essential part of computer execution of decisions and operations

c. Not used in modern apps

d. Limited to games only

51 .What is meant by Plaintext?.....

a. Encrypted text

c. Original clear text

b. Unreadable text

d. Text protected by key

52 .Ciphertext is:.....

a. Original text

b. Text understood by everyone

c. Text after converting it to become unintelligible

d. Text containing no key

53 .Which of the following is considered a correct use of encryption?.....

a. Spreading viruses

b. Asking for ransom

c. Protecting messages and passwords

d. Deleting data

54 .Which of the following is considered an incorrect use of encryption?.....

a. Securing accounts

b. Encrypting data for protection

c. Securing sites

d. Ransomware

55 .Simple encryption relies on:.....

a. Complex equations

b. Very long keys

c. Fixed rules like shifting

d. Artificial Intelligence

56 .Which of the following types is used in banks and companies to ensure maximum security?

- a. Simple encryption
- b. Complex encryption**
- c. Manual encryption
- d. Shift encryption

57 .Function ord() is used to:.....

- a. Convert text to sentence
- b. Convert number to letter
- c. Convert letter to its number in Unicode**
- d. Decrypt only

58 .Function chr() functionality:.....

- a. Delete letters
- b. Convert letter to number
- c. Convert number to letter**
- d. Encrypt texts

59 .Shift encryption relies on:.....

- a. Subtracting random number
- b. Swapping words
- c. Adding fixed value to letter number**
- d. Changing sentence order

60 .Shift decryption is done through:.....

- a. Adding encryption key
- b. Deleting first letter
- c. Subtracting key from encrypted letter number**
- d. Swapping letters automatically

Put (✓) or (X)

1. The pandas library is used to read Excel files and analyze data. ✓
2. The head() function displays all the data in the table. X
3. The matplotlib library can create bar, pie, and line charts. ✓
4. The command grades.max() calculates the average grades of students. X
5. df.corr() helps identify the relationship between different subjects. ✓
6. plt.show() does not display the chart. X
7. Using (grades > 13) gives true or false results for each student. ✓
8. The code grades.mean() returns the highest grade, not the average. X
9. The file grades.xlsx must be in the same folder as the Python program for the code to work correctly. ✓
10. The command grades.mean() calculates the average grades of students. ✓
11. Pandas can be used to create charts without the need for the matplotlib library. X
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Amira Hassan

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9

